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FLIGHT

AIRCRAFT, SPACECRAFT, MISSILES

Official Organ of the Royal Aero Club First Aeronautical Weekly in the World Founded 1909

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Short Range Aide-Memoire—

AEROFLOT'S keen interest in Decca—expressed so recently after the débâcle that was the short-range navigation aid meeting in Montreal—appears to be based on an impartiality of judgement that was lacking among member-country delegates of the International Civil Aviation Organization. For all its democratic processes, I.C.A.O. failed to evaluate Decca and VOR/DMET on technical merit—failed even to complete the full technical comparison that was to have determined the best aid as a standard for the world to follow.

It has been left to Russia to undertake the disinterested study of the rival short-range navaids, and it seems unlikely that political considerations or the proximity of the Swedish Decca chain (onto which B.E.A.'s Mk 7 receivers are locking even in the vicinity of Moscow) could significantly influence the preference of so mighty a civil air power. As with the recent Russian selection of the Pye instrument landing system for Moscow Airport, the best explanation is that Russian orders are placed where the best system and engineering are to be obtained.

If Aeroflot *does* choose Decca as a standard aid (and the airline's interest extends also to the long-range Dectra) I.C.A.O.'s council could not realistically endorse only VOR/DMET when almost a quarter of the world's air transport—for that is what the addition of the Russian civil air fleet may soon imply—insists on Decca.

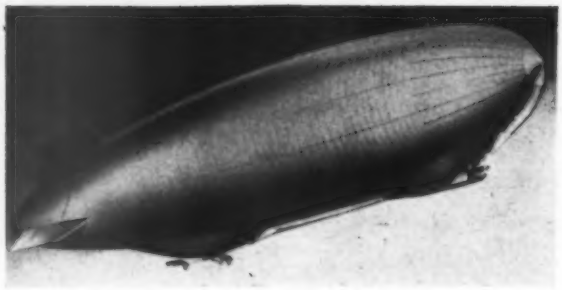
—and the New Spirit

THERE are people who warn that Aeroflot is an instrument of Communism's bid for economic mastery of the world; that it is hellbent upon the prestigious waving of the Red Flag regardless of cost; that it is intent upon the wrecking of I.A.T.A.; and that it is up to goodness knows what else besides.

There are others who say that these are perverse and stupid suspicions. Having now acquainted ourselves—see pages 734-737—with the Aeroflot of May 1959, and felt the remarkably relaxed and confident mood of the Russians today, we feel inclined to join the latter school of opinion—with some reservations.

Among these is the need for those who enter future commercial agreements with Aeroflot not to compromise their allegiance to the authority of I.C.A.O. and—for all its faults—I.A.T.A. These organizations, while inevitably the objects of scathing criticism in a free world, stand for order and sanity in the development of mankind's most dynamic international industry. They must never be undermined from within.

Having said that, let it be fully acknowledged that not only have Aeroflot evaluated Decca and bought Pye I.L.S.: their controllers and crews speak English, the I.C.A.O. language; they appear to have adopted in spirit many of I.A.T.A.'s principles—including two-class service and international rates; they have produced a comprehensive air information publication (A.I.P. as we know it) conforming remarkably closely to I.C.A.O.'s prescribed format; and—as we shall relate in a future issue—they have been unstintingly helpful to B.E.A. in the Corporation's difficult job of opening up the first British commercial establishment in Russia for 30 years.



IN TWO YEARS' TIME, according to Goodyear Aircraft Corporation, a nuclear-powered airship—of which this is an artist's conception—could be put into service. It would be of 4½ million cubic feet capacity, three times larger than conventional craft now in use

FROM ALL QUARTERS

Inter-city Speed: £10,000 Incentive

AN "any vehicle" race between Marble Arch in London and the Arc de Triomphe in Paris, for prizes totalling £10,000, has been announced by the *Daily Mail*. This spectacular enterprise commemorates the Louis Blériot cross-Channel flight of July 25, 1909, to win the *Daily Mail* prize of £1,000. Prizes on this occasion will be £5,000, £2,500 and £1,500 for first, second and third placings; and an additional special prize of £1,000 will be awarded to the competitor who in the *Daily Mail* editor's opinion makes the most praiseworthy attempt.

The theme of the competition is that while the speed and range of air travel have grown immensely since Blériot, quickness of travel between the centre of Paris and the centre of London has not increased to anything like the same extent. In this contest, which is being organized in association with the Royal Aero Club, competitors may travel in either direction between July 13 and 23 by any combination of any numbers of types of vehicles and may make as many attempts as they wish.

The first entry comes from Silver City Airways, who have engaged Stirling Moss to drive from Marble Arch to Ferryfield; he would then be flown to Cormeilles and drive into Paris. This special-prize attempt would take about 200 min. Another obvious vehicle combination would be the Fairey Rotodyne (Battersea to Les Invalides) and a motor cycle.

A Nuclear Bomber Prototype

SPEAKING before the American Aviation Writers Association in Washington, Lt-Gen. Roscoe C. Wilson, Deputy Chief of the U.S. Air Staff for Development, stated that funds had been allocated for constructing the prototype of a nuclear-powered bomber. For at least a decade the U.S. Air Force and Atomic Energy Commission have been studying the feasibility of such a vehicle, but it is only during the past few months that the final technological hurdles—in particular that of shielding—have been surmounted. General Wilson is reported to have said that the aircraft will not necessarily be larger than the B-52, and will be capable of launching ballistic missiles from any point on Earth after a flight at any suitable altitude. It is unofficially stated that the propulsion system will utilize direct-cycle turbojets.

R.A.F.A.'s Big Week

TOMORROW (May 30) the Air Week organized by the Royal Air Forces Association at Brighton opens with a big air display at Shoreham Airport from 2.30 p.m. onwards. This is being attended by Prince Bernhard of the Netherlands, who tomorrow morning at 11.30 is due to inaugurate the Air Week officially in a ceremony at Old Steine, Brighton.

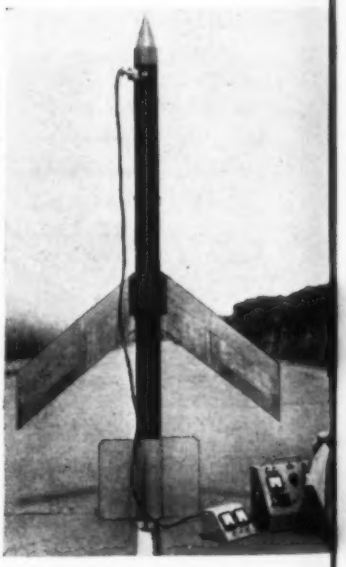
Substantial R.A.F. participation is promised in the display, from the Hunters of No. 111 Sqn. to Javelins and Canberras and from the V-bombers to a Chipmunk. Veteran machines will also be on view—a Spitfire and a Hurricane, a Gloster Gladiator and an Avro 504K. The U.S.A.F. is participating, and there are to be parachute-jumping and gliding demonstrations.

During the week, the R.A.F. is taking part in various flying and ground events which precede the annual R.A.F.A. conference at the Dome on June 6 and 7.

Bristol Future

COMMENTING upon the affairs of the Bristol Aeroplane Company's group, Sir Reginald Verdon Smith (chairman) says in his statement for the year ended December 31 that the upward trend which had continued for seven years was reversed last year. In his view this downward tendency will continue during 1959 and 1960, and the point at which it will level off depends on prospects for the next generation of civil aircraft and engines, the scale of the defence programme and the group's success in increasing its share of the market.

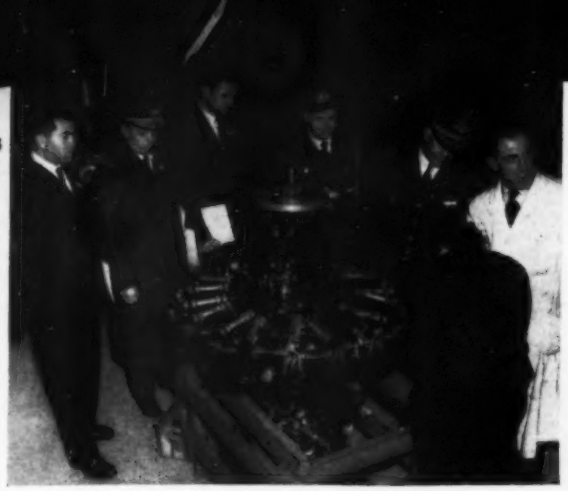
FLUTTER DART, displayed by Armstrong Whitworth Aircraft at the recent International Transistor Exhibition in London. Boosted to supersonic speed by its solid-propellant motor, the dart carries a scaled supersonic - transport wing, the behaviour of which is telemetered during flight. The round on show had flown and been recovered

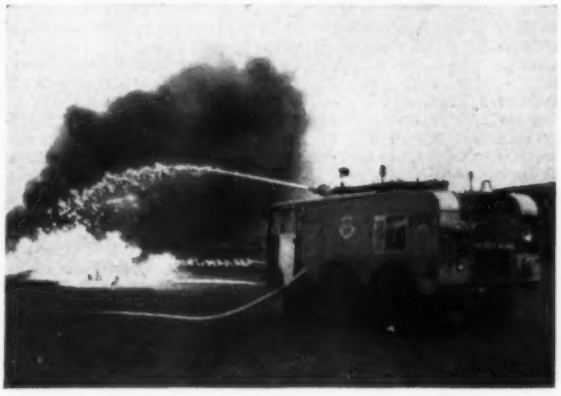


LOOKING UP at the nose air-jet control nozzle of the Short SC.1 at Belfast are (l. to r.) Mr. D. Keith-Lucas, Short technical director; Rear Admiral R. K. Andresen, Deputy C-in-C., Royal Norwegian Navy; Cdr. K. Larsen; and Cmdre. T. Pettersen. The Norwegian visitors—a guided-weapons mission — also saw Seacat, the guided missile being developed to succeed the 40 mm gun as standard A.A. armament in the British Royal Navy

He reports that fifty-one Britannias had been delivered by the end of 1958 and that "although sales on the scale for which we had hoped have so far eluded us, further negotiations are in progress." The Type 188 all-steel supersonic research aircraft is being developed by Bristol under M.o.S. contract. In his comments on engines, the chairman says that further development of Bristol ramjets will extend their range for missiles and make them suitable for supersonic manned aircraft. He adds: "With the support of the Mutual Weapons Development Programme, a turbofan engine is being developed for short-take-off aircraft and leads on to a new generation of ducted-fan engines of great promise."

In his financial comments Sir Reginald states that during 1958 the Bristol Group achieved a record level of sales—an increase of 33 per cent over 1957. But reduced profit margins and increased outlays on research and development led to a reduction of 23 per cent in net profits before taxation. Deliveries during 1958 were worth £76m, orders received £47m and orders on hand at the end of the year £96m. The reduction in forward orders was almost entirely attributable to a lack of further Britannia orders.





ALVIS AT HOME: On May 21 Alvis Ltd. entertained at Coventry most of the military attachés accredited to Great Britain. At upper left a group is examining a Leonides. Immediately above, at Baginton, are the Alvis-powered fixed-wing aircraft which were demonstrated—Sperry's Hunting Prince (in the air), and, on the ground, the Scottish Aviation Twin Pioneer and Prestwick Pioneer, Hunting Provost and de Havilland Beaver 2. On the immediate left (also at Baginton) an Alvis six-wheel-drive fire tender of the M.o.S. Fire Service (R.A.E.) goes into action against a simulated crash-fire

Vertijets' World Tour

TWO models of the Ryan X-13 Vertijet experimental VTOL aircraft are to be taken on an extended world tour by the U.S.A.F. Powered by Rolls-Royce Avon engines, these aircraft have been extensively evaluated at Edwards A.F.B. and all available information has been obtained from them. One of the two will be taken through the European theatre, and both aircraft will eventually come to rest in the Smithsonian Institution, Washington, D.C., and the Air Force Museum at Dayton.

Helicopter Association may Lose Identity

TWO special resolutions are being proposed at an extraordinary general meeting of the Helicopter Association of Great Britain, to be held at Londonderry House on July 10. One asks that a conditional agreement made between the Association and the Royal Aeronautical Society, whereby the former organization would become an R.Ae.S. rotorcraft section, be put into effect; and the other proposes that the Association be wound up voluntarily.

In an explanatory letter to members, the Association says that its council was invited some time ago by the Society to consider the possibility of a merger, which would coincide with the formation of an R.Ae.S. rotorcraft section. It adds that the Association's solvency has largely been maintained by voluntary donations; individual membership has shown signs of falling off and the financial outlook "appears unlikely to improve significantly."

Bob Reeve Retires

THIS week-end sees the retirement (on May 31) of Squadron Leader R. W. Reeve as principal of the de Havilland Aeronautical Technical School, a position he has held since 1941. Some thousands of apprentices have benefited from "Reevo's" wisdom and judgment.

Before becoming principal, Bob Reeve was C.F.I. at No. 13 E.F.T.S., operated by de Havilland at White Waltham. He had held that position since 1935, and in 1937 was awarded the A.F.C.

He learned to fly in Egypt, having transferred to the R.F.C. from the Army (in which, during the Gallipoli campaign, he had won the M.M.) in 1916. Subsequently, serving with No. 113 Sqn. in Palestine, he won the D.F.C.

After the war, he was one of the first to start joy-riding, with a company in which he was both partner and pilot. Then in 1923, with the formation of the R.A.F. Reserve, he became a flying instructor with the school at Renfrew. It was in this capacity that he joined de Havilland at Stag Lane in 1925, becoming C.F.I. towards the end of 1929, and in that position being responsible for opening up the aerodrome at Hatfield in 1930.

Following S/L. Reeve's retirement, his duties at the Technical School will be undertaken by Mr. G. W. Trevelyan as education manager of de Havilland Holdings Ltd.

IN BRIEF

Management of the Nederlandse Helicopter Industrie has been taken over by Maatschappij voor Vliegtuigbouw Aviolanda N.V. at Papendrecht. The N.H.I. offices are now at Veerdam 44, Papendrecht.

A Man-powered Aircraft Group of the Royal Aeronautical Society has been formed. Its programme and organization are being discussed by a steering committee, and the Group's inaugural lecture is planned for October 30.

Two I.L.S. systems have been ordered from Pye Telecommunications Ltd. for installation at Moscow/Vnukovo airport as reported on page 736. The order is reported to be worth about £100,000. One Pye I.L.S. system is already installed at Prague.

A film show being given by Air-Britain at Caxton Hall, S.W.1, next Wednesday (June 3) includes two items spanning thirty years of flying—the R.A.F. Pageant of 1928 and the S.B.A.C. flying display of 1958, the latter in colour. Visitors—space permitting—are welcome.

Our associated journal *The Motor Cycle* is giving full coverage to the Tourist Trophy Races in three special issues. Next Thursday's (June 4) will include full reports of the Formula I and Junior Races, with prospects for the Senior event; the June 11 issue is to contain accounts of the Senior, Lightweight and Sidecar Races and a report on the opening stages of the 1959 International Scooter Rally; and a T.T. Review will be published on June 18.

***IDENTIFICATION PARADE** after the first Air-Britain National Aircraft Recognition Contest, held recently. From right to left:—* P. Jordan, F. W. Rumsey (holding the Hunting Trophy) and P. M. Corbell, members of the winning S.W. Essex branch "A" team; L. N. Long, individual runner-up, and J. M. Gradidge, individual winner (with the B.E.A. Trophy); Mrs. Farmer, a vice-president of Air-Britain; and A. Boyce, R. Dyster and C. Harris, of the Harrow and Wembley branch "A" team who were runners-up

Flight to MOSCOW

PART II

Operational Background to B.E.A.'s New Service

by J. M. RAMSDEN

HERE, to follow up last week's review of the commercial aspects of the new B.E.A.-Aeroflot service, is a report from Moscow about the operational background. The author accompanied the second inaugural Viscount 806 service

Moscow, May 17

VNUKOVO AIRPORT is full of surprises. Just who, we wondered, was that straw-hatted Chinese in the hall of the terminal building, carrying a pair of antlers under one arm and a bouquet of flowers under the other? And was it usual for arriving Tu-104s to taxi right up to the terminal entrance to disgorge their passengers, and then to be towed away by a lorry? Was the mighty array of Tu-104s and Il-18s (we lost count after 25 and 10 respectively) commonplace? What *is* the explanation of the curiously herbal smell of the Moscow air?

These and many other inscrutabilities have to be accepted here—just like Moscow's freak thunderstorms. One which was forecast while we were *en route* fortunately abated without delaying our arrival. But it delayed our B.E.A. reception party, whose car was stopped by an "onslaught of hailstones as big as cricket balls."

A pleasant surprise was the agreement among B.E.A.'s people here, with only apparently minor reservations, about Russian helpfulness towards the British, and towards B.E.A. in particular.

You have only to glance through the Russian A.I.P. (air information publication) to appreciate how far east-west civil aviation relations have now advanced. Eighteen months ago Russian operational procedures were virtually a closed book, except for the rudimentary information gathered from the occasional special flight—always accompanied by Russian crews—of R.A.F. Transport Command.

Now B.E.A.'s captains have in their briefcases a route book, prepared in the standard Aerad format by International Aeradio Ltd., as an extension of the Scandinavian Section (D) of the familiar *Flight Guide*. This route book tells B.E.A. crews all they need to know about airways rules and procedures. Of particular interest is the Aerad Radio Navigation Chart, from which the map below has been adapted. As yet the customary Aerad approach and landing charts have not been prepared, but they will be available after B.E.A. report on final details following the inaugural services. In the meantime the information is available to B.E.A. pilots on clearly intelligible bi-lingual charts provided by the Russians.

When presented with copies of Aerad's radio navigation charts for the London - Moscow route, the Chief of the Russian A.I.S. inquired whether copies could be produced by Aerad in Russian for use by Aeroflot crews. Aerad took up the challenge; the first chart covering the sector Riga - Moscow is now in production and copies are to be sent to the Russian A.I.S. for trial by Aeroflot crews. This can be regarded as quite a bouquet for the Aerad cartographer-editors, who of course worked entirely from information supplied by the Russians. Aeroflot, incidentally, raised no objection to the fact that the Russian Section of the *Aerad Flight Guide* is available to anyone who wants it.

The Chief of the Russian A.I.S. was also handed an inscribed presentation set of Aerad's ultraphaned topographical map panels for the route Moscow - London. He was both impressed and delighted and immediately asked Aerad to prepare a trial set of similar map panels covering the Aeroflot route Moscow - Rangoon.

The information which, so to speak, ends up on the chartroom tables of B.E.A.'s Viscounts is sent by the Russian aeronautical information service (known to them as it is to us, by the initials A.I.S.) of the U.S.S.R. Civil Air Fleet. The information enters Britain via Pinner, home of the Ministry of Transport and Civil Aviation's A.I.S. Pinner's first official communication was a *Notam-U.S.S.R.* dated January 7, 1958. This piece of paper was quite historic, for it signified that the Russians were supplying not only the information, but were doing so in the manner and format recommended for international usage by the International Civil Aviation Organization. The subject of the Notam (this word, derived of course from the English "Notice to Airmen," now seems to be part of the Russian vocabulary) was the announcement that Kubinka airport, 64 km from Moscow Vnukovo and formerly a military base, could now be used by B.E.A. as an alternative. During 1958, so it is said, about 100 Notams—Class Is and Class IIs—were received at Pinner.

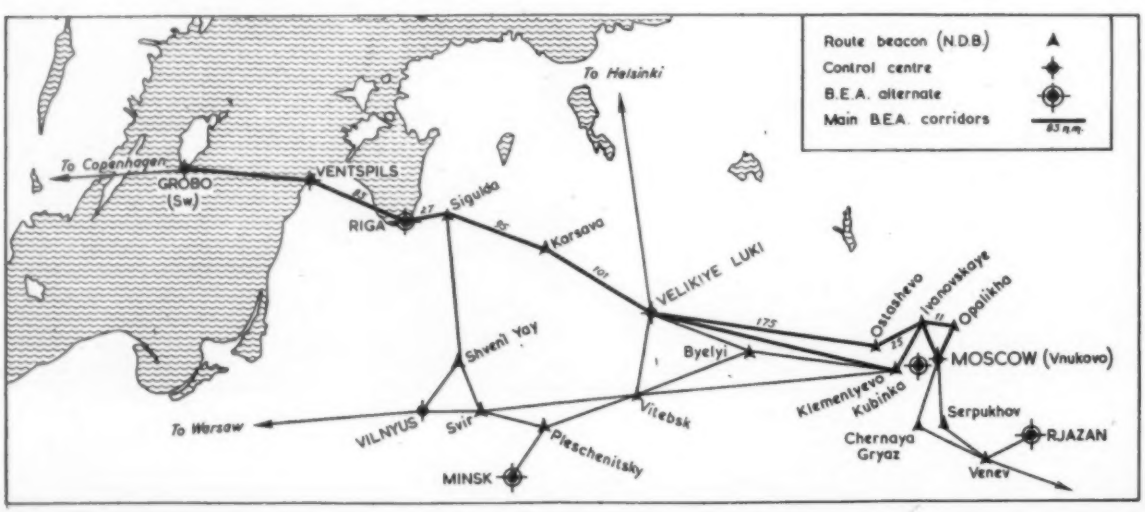
Then, about a month ago, as noted above, the A.I.P. arrived. This event was described by a Ministry official as "a fantastic breakthrough." The document, in English and Russian, and formally entitled *Aerodromes and Radio Navigation Information Guide*, conformed closely to the I.C.A.O.-prescribed format—with the exception of the AGA section (aerodromes and ground aids), though the necessary basic AGA information has been supplied. The A.I.P. contained 80 pages, and—as one B.E.A. official said—it was evidence not only of eagerness to co-operate but of willingness to learn also.

This document, from which International Aeradio have prepared B.E.A.'s route book, is the operational bible of the Moscow service. The procedures are clearly explained in good English, and they must of course be rigidly adhered to—as the following extract from the Rules of Flight indicates:—

"17. Deviation from the boundaries of the air corridor while crossing the State border of the U.S.S.R. or from the prescribed airway when flying within the territory of the Soviet Union is categorically prohibited.
"18. If the crew of a foreign aircraft is uncertain as to whether they are correctly carrying out the flight instructions, they must contact the appropriate Air Traffic Control Service of the U.S.S.R. Civil Air Fleet and request to be told their position.
"19. In the event a foreign aircraft diverges from its route the A.T.C. unit providing control of its movements renders all possible assistance to lead the aircraft back to the prescribed route but does not guarantee the safety of the flight of this aircraft outside the route and bears no responsibility whatever for this flight."

The map below and the table on the right refer to route facilities along the compulsory air corridor into Vnukovo Airport, Moscow. Control centres governing the operation of flights are at Riga and Moscow and the boundary separating the two F.I.R.s is just to the east of Velikiye Luki. The non-directional beacons are claimed to have a minimum effective range of 100 miles

	Runway	Length × Width	Surface
Moscow-Kubinka	045/225	8,200ft × 260ft	Concrete
Minsk	120/300	5,900ft × 197ft	Bitumen
Riga	150/330	5,570ft × 164ft	Concrete
Rjazan	065/245	8,200ft × 262ft	Concrete



Our flight to Moscow made it clear that, for B.E.A. crews steeped in Western procedures, three basic operational differences exist: (1) Airways are compulsory corridors; (2) height separations are not prescribed according to the familiar quadrantal rule; and (3) let-down procedures—and at the moment I.L.S. equipment—are different.

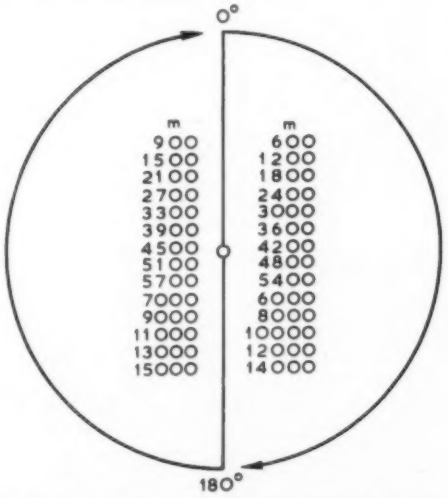
Corridors. The corridors shown on the map are 20 km wide and are located by powerful NDBs and, at en route control points, by VHF/DF fixer services. The difference in meaning between "corridor" and "airway" is important: the corridors to and from Moscow, and those to the alternates, are absolutely compulsory. There are no advisory routes as we know them: "controlled airspace" in Russia really is controlled airspace, and it seems reasonable to suppose that—as is the eventual aim in respect of U.K. airways—comprehensive radar surveillance is in force.

The initial report of one's intention to enter Russian airspace—namely, the boundary of the Riga Flight Information Region, which extends to a line about 12 km west of Ventspils—has to be given 100-150 km away. The procedure is to call up Riga FIC (Russian abbreviation is RDS, meaning regional control service), reporting one's registration, height, speed, course, and E.T.A. over the next reporting point in Moscow time, i.e., G.M.T.+3. Thus the rule about not communicating with one F.I.R. whilst in contact with another does not hold good when about to enter Russian airspace. Constant radio communication with Riga must then be maintained—i.e., the crew must listen out all the time. The same procedure holds good when, with the call-sign "Dunay," you call up Moscow on entering the F.I.R. east of Velikiye Luki.

In the corridors the primary aids to navigation are the very high-powered NDB route beacons, the majority of which are MF (though some, we noted, are of higher frequency than the 300-500 kc/s of the western MF band—one being as high as 1,005 kc/s). The next NDB always comes in loud and clear before the last one fades. (Distances between beacons, which are said to have a minimum range of about 100 n.m. at Viscount height, are shown on the map.) A useful belt-and-braces track-guide is provided by the Swedish Decca chain, which on our flight was still being received on the log over Moscow—albeit on a blank chart. One of the first things we heard after our arrival was that Aeroflot are likely to buy Decca—so that, as a picture on the next page suggests, charts for the Moscow region may not be blank for long.

Moscow-Vnukovo terminal-area patterns require inbound flights (see map) to steer for Klementyevo NDB at prescribed altitudes varying from 4-8,000ft. Thence to Ivanovskaye NDB, finally turning on to the duty-runway locator at Vnukovo. Outbound procedures are via Opalikha NDB and away westbound through the beacons at Ivanovskaye and Ostashevo.

Height Separations. The Russians do not fly according to the quadrantal height rules in force in the West. Their system, to give it their title, is the "semi-circular cruising-level system," and it is simply illustrated thus:—

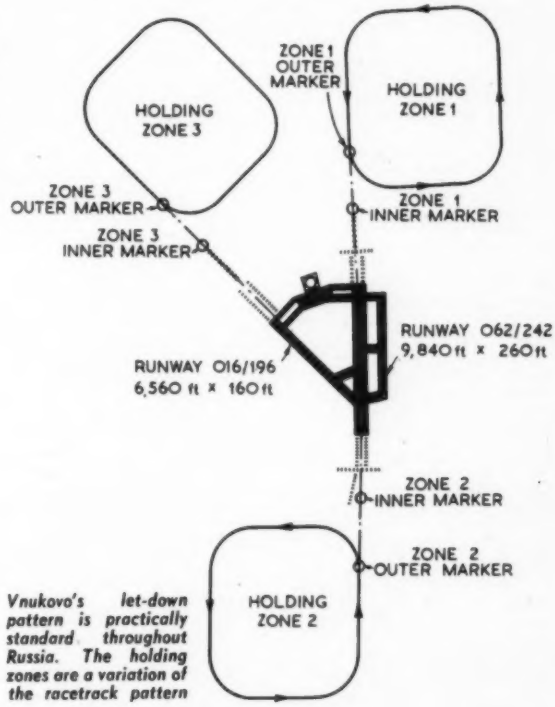


These height rules are simple and logical enough. The problem is that they offer a limited choice of cruising height, which can be important to the economy of B.E.A.'s operations. As the diagram shows, separations eastbound are 600 m up to 6,000 m (19,685ft), thereafter being no less than 2,000 m (6,560ft) at a time. The Viscount 806, which has a typical average cruising height of about 22,000ft (say 6,700 m) can in fact select nothing between 6,000 m and 8,000 m—i.e., it is either 19,600ft or 26,200ft.

Inauguration of B.E.A.'s new service—on Thursday, May 14, 1959

We selected the latter height, as will most B.E.A. flights, as being the "more optimum" of the two available. On the warmer days 26,200ft may not be possible—with consequent limitations of payload in order to maintain the diversion-reserves. Only in low outside-air temperatures of the winter, and at relatively light cruising weights, will it be possible to ascend to the 10,000 m (32,800ft) level. This is unlikely—though it was done, to the momentary incredulity of the Russian A.T.C. service, on a proving flight early in 1958.

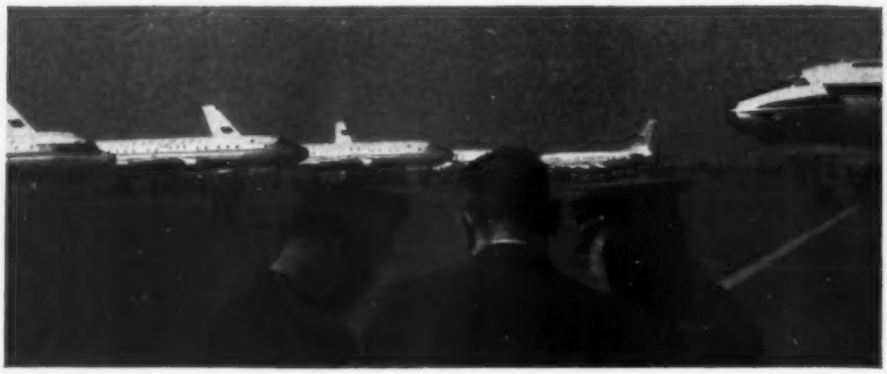
The standard altimeter setting for flights over Russia is based on 760 mm of mercury, corresponding with our 1013.2 mb. For altimeter settings for landing the Russians use QFE and not QNH. Their Q-code, incidentally, corresponds exactly with ours.



Vnukovo's let-down pattern is practically standard throughout Russia. The holding zones are a variation of the racetrack pattern

Let-down Procedures. Holding, approach and landing procedures in Russia conform to a standard pattern—so far as we were able to ascertain—at all civil airfields. They call it the "square beacon landing system" and, as the diagram of the Vnukovo pattern shows, there is a holding zone (actually rectangular rather than square) for each runway. This rectangle is based on the outer NDB of two runway markers; you turn on this, with the long legs parallel to the runway, until the time comes to make

Flight to MOSCOW . . .



Discussing the Moscow - London flight plan as Marshal Zhigarev's Tu-104A is towed out by lorry for take-off are the airport commandant (left), Mr. Danielechev (back to camera), and Col. Baskirov. On the right is the nose of one of C.S.A.'s three Tu-104As
"Flight" photograph

the final turn on to the QDM of the runway. You then come in on the inner marker.

This procedure seems to form an adequate let-down aid, and it has the merit of being universal. Russian I.L.S., being of the phase-comparison type, cannot be received by the British (or any Western) airborne equipment. The glide-path can be picked up but, rather unhelpfully, with reversed indications. The Russian A.I.P. has full information about I.L.S. procedures and, as we learned after our arrival at Moscow, a Pye I.L.S. installation is to be bought for Moscow Vnukovo for the benefit of Western-I.L.S.-equipped airliners. (One has already been installed at Prague.)

Another example of Russian readiness to co-operate is that G.C.A. is available at Moscow in English, which was not the case a year ago A talk-down handbook, in both languages, was supplied for B.E.A.'s crews, and the voice patter conforms to the standard I.C.A.O. phraseology.

* * *

So much for the three basic operational differences. A couple of years ago, of course, language was the biggest barrier. But in conformity with I.C.A.O.'s *International Standards and Recommended Practices* (Annex 10, Part III, 5.3.1.1.2.) the Russian air traffic control services speak to B.E.A. flights in clear precise English—and so, we were told, do the Tu-104A crews on the London - Moscow run. For the time being, at any rate, all B.E.A. flights will be accompanied, just in case language problems arise (such as G.C.A. talk-down at alternates), by a Russian-speaking supernumerary crew-member—Mr. Michael Tomkins, 25, who learnt the language while on his national service in the Army. It is only 15 months ago that the first British aircraft—a B.E.A. Viscount—flew into Russia without the then-mandatory Russian check-pilots.

Considering how recently we looked upon the Russians almost as men from another planet there have been amazing strides forward. There are still many difficulties which only time and patience can surmount. For example, our own personal negotiations with the Russians over travel formalities and a visit to Aeroflot were curiously frustrating. However, as someone on our flight remarked, to criticize after so many obvious efforts to co-operate might cause the scaffolding to collapse—though B.E.A. is, we feel, building up something more substantial and useful than scaffolding.

As a postscript to Part 1 last week, which dealt with the commercial background to the story, it is a curious fact that B.E.A. do not operate in pool with Aeroflot—so that the Russian airline is virtually the only one of the Corporation's international rivals with whom revenues are not shared. A subsequent article will review other commercial and operational aspects as seen from Moscow. In the meantime here are some preliminary personal impressions of what was seen of Aeroflot, whose fleet now carries —according to one senior official—10 million passengers a year.

AEROFLOT, MAY 1959

WHEN our Viscount had crossed the boundary of the Riga F.I.R., and we were under Soviet suzerainty for the first time, a fellow-passenger leaned across me, looked out upon the Russian countryside 8,000 metres below, and remarked: "Another illusion shattered—looks just the same as any other country to me."

Why should I, too, have felt mildly surprised that the houses and fields and trees and clouds looked quite normal? Do Russians look down upon East Anglia from the windows of the Tu-104A with thoughts as benighted? If so, the ease with which they and we can now cross the B.E.A.-Aeroflot bridge should help to spread enlightenment.

Yet Aeroflot, the U.S.S.R. Civil Air Fleet, *is* different. When you land at Vnukovo airport, Moscow, you are in a new air transport atmosphere. As we taxied past phalanxes of Tu-104s, Il-18s, Il-14s and Li-2s there was only one American airliner to be seen—an Air France Super Constellation—and ours was the only Viscount. There were no Shell or Esso or BP fuellers, as there are at airports in the west. The steps were driven out to meet us under their own power—something I had personally never seen before. The blue Aeroflot uniforms were of a completely different cut, rather baggy and with gold chevrons on the sleeves according to a rank-system which I never quite mastered. The airport police—or militia as they call them—wore khaki tunics, blue trousers and green and yellow badges of rank, and there were very few about (far fewer than one sees at London, the world's most officious airport). The hostesses were ample, homely and smiling. Aircraft were being towed by lorries instead of by tractors, and as for the aeroplanes themselves . . .

Nowhere in the world can you see so many aircraft belonging to one airline. At La Guardia or at Los Angeles you will see as many—perhaps more—but they are of diverse ownership and nationality. Here, at Soviet Russia's busiest airport, you can gauge the might of Aeroflot. After touchdown, as the flat-pitched Rotols press you forward from your seat, you catch your first glimpse of Soviet air-power—fifteen Tu-104 fins sticking up shark-like from behind the brow of a slope, then a cluster of six Il-18s, and four more, then ten more Tu-104s, and everywhere countless dozens of Il-14s.

There is no apparent conformity of colour-scheme. The Il-14s had no white tops, and only a small "Aeroflot" on the nose with a dark blue line down the windows. The registrations of these dowdy Convairesque aircraft were five-figure, the first numeral varying from 0 to 6. The Tu-104s and Tu-104As all had the fussy markings they bore when we first saw them three years ago—white tops, blue and red cheat-lines. I noticed four figure and five-figure Tu-104 registrations, and these were worth noting down because they give a clue to quantities. The Tu-104s I saw had two kinds of registration—the old-fashioned L-series and the new five-figure series. The former varied from L5413 to L5446 and the latter from 42347 to 42424. Thus, assuming that Aeroflot number their Tu-104s logically, I saw representatives of batches of more than 100.

I was interested particularly in the Il-18, of which I counted about ten on dispersal, in the maintenance area, and on the apron. The Il-18, which has been in passenger service for a month (since April 20), appears to be an extremely effective—not to mention good-looking—airliner. The registrations I saw ran from 75654 to 75678. There are 40 in service, so I was told on

different occasions by different people. The colour-scheme of blue and white was stylish and elegant—perhaps one of the many outward signs of the new Aeroflot spirit which the present articles have illustrated.

For an airline which (according to some) is allegedly bent upon world domination, Aeroflot is curiously reticent about itself. Never once to my knowledge has it issued to the non-Communist Press a word about itself or its achievements. Polite approaches of inquiry—perhaps seeking something as innocuous as a time-table—are not acknowledged. Irresponsible journalists could, if they so wished, invent the most fantastic libels about Aeroflot and never receive a word of protest. And it has always proved impossible to prearrange meetings or interviews. Although *Flight* has printed 20,000 words about Aeroflot—notably including a series of articles by a British trade-union official in August 1957—nothing has been supplied in response to an editorial request.

The machinery of public relations—that abused but indispensable guardian of a reputation—does not exist in Aeroflot. This is understandable, as someone said, because nobody can dispute that Aeroflot is the biggest and best airline in Russia. But the absence of information makes for many a wrong impression.

Thanks to the good offices of the B.E.A. manager in Russia, Mr. M. S. Brander, and his wife, I made an early start one morning for Vnukovo, whence Marshal Zhigarev and party were due to depart for London. Photography at Vnukovo is not normally allowed, but permission was granted for this occasion. Having got permission, and once through the gate with a camera, you can photograph anything without restriction.

A meeting with Mr. Grennadi Voitsekhovitch, chief engineer, Aeroflot Moscow Region, was spontaneously arranged by Mr. Danielechev, who stands close to Marshal Zhigarev and Col. Baskirov (chief executive) in the Aeroflot hierarchy. Would a look around the Il-18 be of interest? Indeed it would, and soon we were driving in a Volga across the apron towards Il-18 U.S.S.R. 75672, prepared for service and awaiting its passenger-load for the daily flight to Adler on the Black Sea.

The answers to our questions came as readily as the language barrier permitted. The aircraft entered regular passenger service on April 20, following a programme of cargo-carrying proving-flights, and it is used on a daily service to Adler and Sochi and thrice weekly to Alma. It is designed to use any airport that the Il-14 can use. How many were in service? "There are so many," Mr. Voitsekhovitch replied, "but I should say about 40." Maximum seating was, he said, 95; present layout—all five-abreast—was 65 tourist and 15 first-class. The engines were AI-20s of about 4,000 h.p. each, the A.I. being the initials of the designer, Alexander Ivchenko. (This was announced in our Aero Engines issue of March 20; previously the Il-18 had Kuznetsov NK-4s of the same power.)

At this point the captain and co-pilot came aboard and, though obviously not having much time to spare, joined cheerfully in the laborious process of question, interpretation and answer, with the odd explanatory diagram thrown in. Maximum weight, they said, was 58 tonnes (about 127,800 lb); commercial payload 14 tonnes (about 30,800 lb); average cruising speed 600-620 km/hr (320-340 kt); letdown speed 260 km/hr (140 kt); max. weight take-off distance to 50ft about 3,900ft; landing distance about the same. Engine overhaul life was 500 hr already, with the prospect of 1,000 hr "within a reasonable period." Normal cruising height was 8,000-9,000m (26-29,000ft), for a cabin height of 2,500m (8,200ft). Cruising height at full load could be maintained on two engines only—this, it was explained, was in accordance with the Ilyushin doctrine of four-engined air transport.

We looked round the cabin. It was quite non-Tupolev and—like the exterior paint-scheme—in the idiom of the West. The 65 tourist seats were light green with white linen headrests and pillows. A Persian carpet running the length of the aisle was the only link with the ornamentation of the Tu-104. The curtains were cotton, and striped in lilac and grey. The imitation-wood-veneer bulkheads were yellow and cheap-looking and tended to spoil the general effect of pleasing simplicity. The walls and hatracks (shelves, not rails and netting) were of grey leathercloth, and the ceiling lights were of opaque plastic, simple and neat. Babies' cots—the fabric of which seemed to be of pure silk—hung from each side of the forward bulkhead. Above each row of seats in the hatrack was a Western-style fixture comprising steward's call button, reading lights and fresh-air louvres.

"We heard after our arrival that Aeroflot are likely to buy Decca—so that charts for the Moscow region may not be blank for long." Marshal Zhigarev examines a Flight Log display unit during his visit to London

The first-class compartment for 15 five-abreast passengers had red seats and carpet. Separating the two compartments was a truly vast (by our standards) galley, with masses of working-tabletop, and a large curtained-off wardrobe on each side of the aisle. The three stewardesses were putting cards on certain seats proclaiming—in English as well as in Russian—that they were reserved.

The most unusual thing about the flight deck was the design of the seats. They were really comfortable reclining chairs, upholstered in foam-rubber covered with a green woollen cloth, and with arm-rests that folded up and back out of the way. "What do you think of these?" asked Mr. Voitsekhovitch, settling back into one, tipping his hat on to his nose and pretending to snore. "They are very popular with our pilots."

The dash panels were grey, which means that all the world's aircraft designers have now followed American practice and abolished black, hard-to-read instrument panels.

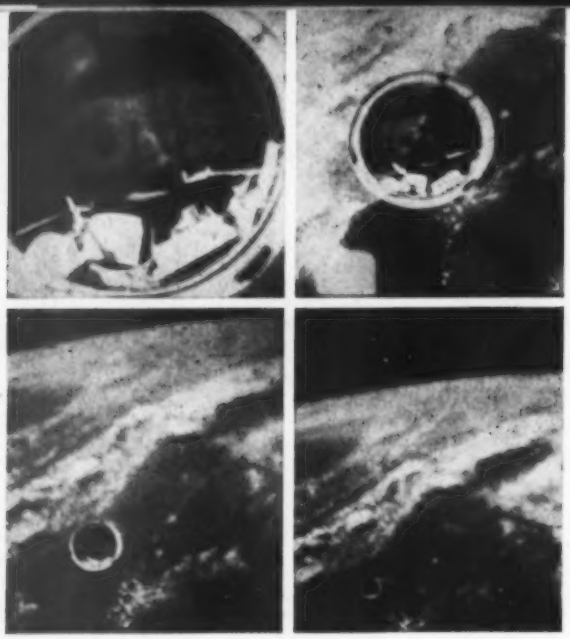
There was no engineer's station: on early flights only a supernumerary flight engineer will sit in the jump-seat. Behind the co-pilot is a radio operator's station and behind the captain a navigator's station. I photographed everything freely, and a note in a future issue will describe the flight deck more fully. There was, incidentally, provision for a radar scope above the central instrument panel, but it was not installed, nor was it in another Il-18 I inspected.

Total capacity of the cargo holds, Mr. Voitsekhovitch said, was 35 cu m (1,236 cu ft), distributed among three holds, the aft one of which was unpressurized. What did he think of the Vanguard? He was sorry, but he had not heard of it. The Britannia? Oh yes—he had flown in it at London. Was it as comfortable and as quiet as the Il-18? Most certainly. Had the Il-18 been sold to any airline outside Russia—LOT, for instance? Not yet.

The passengers for the Black Sea arrived and embarked. Not many British engineers would have cheerfully suffered such interrogation right up to the moment of embarkation. We told him so. "You are our guests," he replied, and he walked briskly off towards the maintenance area.

(To be continued)

The scenes, left and right, at Vnukovo Airport, Moscow, as Marshal Zhigarev embarked on his flight to London. Among those in the picture on the left are Mrs. M. S. Brander, wife of B.E.A.'s manager Russia, and (left) A. Cdre. Sanders, air attaché at the British Embassy "Flight" photographs



Of surprising clarity, these four photographs were taken by a camera contained in the nosecone of a U.S.A.F. Thor, fired from Cape Canaveral on May 12. The first was taken immediately after separation, at some 125 miles altitude, and the instrumentation compartment of the missile can be clearly seen (a cutaway drawing of Thor appeared in last week's issue). The capsule was recovered from the Atlantic some 1,400 miles down-range

Missiles and Spaceflight

AUSTRALIAN ROCKETS

Two types of high-altitude sounding rocket, designed and built in Australia, have been fired to heights up to 100 miles in recent experiments. Announcing this in Canberra on May 20, the Australian Minister of Supply, Mr. A. S. Hulme, said that one was Long Tom, a 27ft rocket weighing almost one ton, and the other was Aeolus, 21ft in length and about half a ton in weight. The former had reached a speed of 4,000 m.p.h. and the latter 3,000 m.p.h. Instrument payloads up to 50 lb were carried by the rockets, which were used to measure micro-meteorite prevalence at high altitudes and wind patterns at an altitude of 40 miles.

CANADIAN SPACE PLANS

Preliminary arrangements have been made by Canada and the U.S. National Aeronautics and Space Administration to launch a Canadian satellite in 1961. This was stated recently by the Canadian Prime Minister, Mr. Diefenbaker, during an address at Kingston Royal Military College, Ontario. The Canadian government, he said, was to establish a permanent joint committee on space research in order to co-ordinate the overall Canadian space programme. The nucleus of the committee would come from the National Research Council and the Defence Research Board, supported by other Government agencies and interested universities.

Mr. Diefenbaker said that Canada was developing a high-altitude rocket which would be "highly efficient as a research instrument." He continued, "I believe that Canada should maintain its status as a scientifically advanced nation, and continue a sound programme of research into outer space."

SPACE STUDIES AT U.C.L.

Legal as well as scientific aspects of outer space are currently under study by members of the staff of University College, London. In addition to the widely publicized work of Prof. H. S. W. Massey (as chairman of the Royal Society's space research committee, and as leader of the team which is to visit the U.S.A. to discuss co-operation in satellite launchings in connection with this country's space programme), Dr. Bin Cheng, lecturer in international law and air law, is currently investigating the legal problems arising from man's penetration into space.

This work is being assisted by a £2,300 grant from the Rockefeller Foundation. Dr. Cheng, who has been teaching air law at U.C.L. since 1953, has already published several papers in legal journals on the subject of high-altitude and space flight. His article *International Law and High Altitude Flights: Balloons, Rockets and Man-Made Satellites* appeared in the *International and Comparative Law Quarterly* in July 1957, shortly before the Soviet Union launched the first artificial Earth satellite. An indication of the preliminary conclusions from Dr. Cheng's present investigation may well be expected at a public lecture which he is to give at the College on October 20.

THE ANTI-ICBM PICTURE

During the past year the anti-missile pot has been simmering in Washington and now promises to come to the boil. As we reported in our December 5 issue the only system yet to have reached the hardware stage is the Nike-Zeus of the U.S. Army; and the U.S. Air Force are, to put it mildly, not anxious to see army dominance in this field.

Last week the chief scientist of the U.S.A.F., Dr. J. V. Charyk, possibly embarrassed by the fact that his own Service has little to offer, attempted to derogate the Nike-Zeus system, suggesting that for effective defence against sophisticated second-generation missiles an entirely new approach was necessary. It was, he said, possible for an ICBM nosecone to dispense "hundreds of decoys," each with trajectory characteristics comparable with those which might be displayed by an incoming warhead. The cost of building an anti system capable of intercepting all such decoys would, he suggested, "bankrupt the nation."

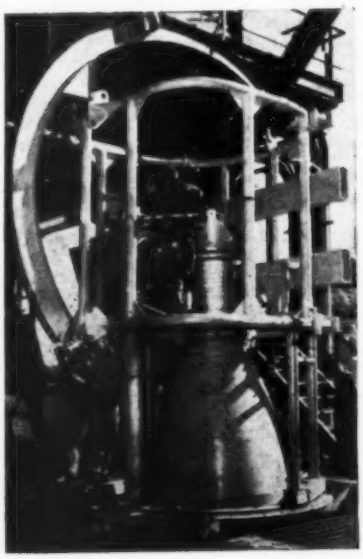
In reply, Robert L. Johnson of Douglas Aircraft (airframe contractor for Nike-Zeus) appeared to be on a firmer wicket. The system was, he said, designed from the outset to intercept missiles whose nosecones could dispense decoys and manœuvre from a simple ballistic trajectory. He urged an acceleration of the Zeus programme and claimed that failure to procure long-lead-time components would lead to a serious deficiency in American defence.

The Vanguard 1 satellite, 6in in diameter, was successfully photographed at its apogee of almost 2,500 miles by the Smithsonian Optical Tracking Station at Woomera earlier this month. A Baker-Nunn precision satellite tracking camera, operated by personnel of the Woomera missile range, was used.

Code and voice radio signals transmitted by the University of Manchester radio-telescope at Jodrell Bank, Cheshire, were successfully received in Cambridge, Massachusetts, earlier this month, after being reflected from the moon. According to Professor A. C. B. Lovell, Jodrell Bank hope to reflect a radar echo from Venus some time in the future.

The third Soviet sputnik made its 5,000th revolution around the Earth on May 8. At that time its orbital period was less than 100 min, or almost 6½ min less than when it first entered orbit, and its total distance covered was quoted as some 142.83m miles.

On May 15 the Secretary of the U.S. Air Force, Mr. James Douglas, announced that the U.S.A.F. had recently fired what was believed to be the largest solid-propellant rocket engine ever tested. The test was stated to be associated with the XSM-80 Minuteman; propulsion for this missile is being handled jointly by Aerojet-General and Thiokol, the latter having the prime contract for the first-stage engine.



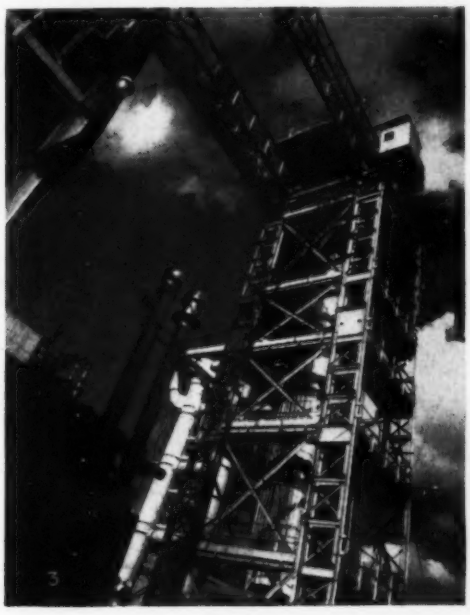
Eight of these Rocketdyne engines will be clustered to provide 1,000,000 to 1,500,000 lb thrust for the first stage of the Advanced Research Projects Agency's Saturn space vehicle. Designated H-1, the new engine utilizes a chamber closely related to that of the Thor, Jupiter and Atlas engines. The first H-1 has now been delivered to the U.S. Army Ballistic Missile Agency, Huntsville

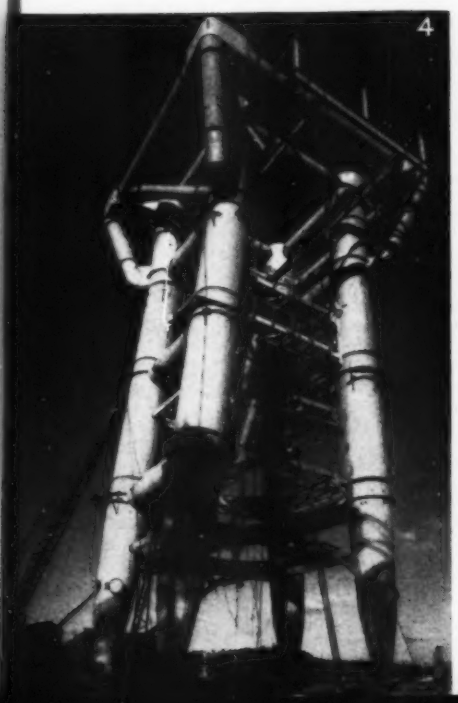
HARDWARE AT HATFIELD

IT was in August 1957 that the Minister of Defence revealed that Britain was engaged in the development of a long-range ballistic missile. Code-named Blue Streak, this weapon is unofficially reported to have a design range of some 2,500 nautical miles. Prime contractor is de Havilland Propellers Ltd.; the airframe has been assigned to de Havilland Aircraft, and propulsion and guidance are respectively being handled by Rolls-Royce and the Sperry Gyroscope Co. We are now able to publish some photographs of the aluminium-painted towers which have become prominent landmarks at the prime contractor's test site on the north side of the airfield at Hatfield, Herts.

First such structure to be erected was that illustrated in photograph (1). This is a simple frame containing six hinged working platforms in which can be located a test specimen of airframe. The tower is apparently intended for basic mechanical tests upon the type of structure adopted for Blue Streak, and the latter is clearly a stainless-steel monocoque with exceedingly thin walls. In the left foreground can be seen part of the erector frame used to place the missile in the tower.

In (2) can be seen a more sophisticated installation completed towards the end of 1957. It is evidently a flow test rig, and consists essentially of a pair of lattice towers connected at the top by a rail-mounted crane. In the nearer tower can be seen storage tanks for liquid oxygen (upper tank) and kerosine, the capacity of each





presumably being the same as those of the integral tanks employed in the missile. A vehicle in the foreground carries a spherical liquid-oxygen tank and a nitrogen bottle.

In the adjoining tower (3) is a complete Blue Streak airframe. This tower is now clad with metal sheet on two sides, the third side having curtains and the fourth being open to accept the missile elevating frame, which is hoisted by twin cables passing over pulleys near the top of the structure. Close by are twin egg-cup storage containers and a large reinforced concrete cell—which, to judge by the loud noises and flames that occasionally issue from it, contains a complete turbopump fed from tankage on the roof.

Photograph (4) depicts a further static tower which arose last autumn. For obvious reasons the Hatfield test site is not suited to full static test firings. It may be that this tower, while not intended to hold a captive Blue Streak with the engine running, may be capable of accommodating a wide range of mechanical tests, such as erection, handling, location on the pad (which probably incorporates weighing and thrust-measuring systems) and certain internal functional check-outs. Thus, this tower has no exact counterpart in the U.S.A. and its curious tubular structure may well prove singularly efficient. To an engineer the bracing at the top may not be aesthetically beautiful, but is doubtless essential in order to confer adequate stability to the tower. This factor is particularly important in view of the fact that the five working platforms must fit the body of the missile precisely, although the tower has to be open on one side, yet must bear the great weight of the Blue Streak and its elevating frame during the erection cycle. A further complication is that the overall height of the installation must not conflict with aircraft operations from the adjacent runway.

Blue Streak engines (*Flight*, May 8) have already been test-fired at Westcott and Rolls-Royce shortly expect to start static firing at Spadeadam in the Scottish border country. At this remote site it is likely that a complete missile will be statically tested before being taken to Woomera—perhaps in a C-130 of the R.A.A.F.—where flight trials should begin before many months have passed.

Missiles and Spaceflight . . .

SPACE NEWS AT THE A.R.S.

THE third Discoverer satellite due to be launched this month, and the NASA family of booster rockets now being developed, were among the subjects discussed at two recent meetings of the American Rocket Society. The first was a two-day conference on *Controllable Satellites* at Massachusetts Institute of Technology on April 30-May 1, and the second was an A.R.S. meeting in New York on May 14.

Discoverer 3, which was to be launched from Vandenberg, would contain a capsule carrying four white mice. This was reported at a dinner meeting during the two-day conference by Congressman Overton Brooks, chairman of the House Committee on Science and Astronautics. Intended for polar orbit, the satellite contained a 35 lb conical capsule 2½-3ft in diameter and 2ft long. After completion of a prescribed number of orbital circuits, the capsule was to be ejected from the satellite and recovered in the Hawaiian area. The experiment, if successful, would mark the first time that a living creature had returned alive from orbital flight.

Details of the Discoverer 2 satellite, which recently fell to Earth somewhere over Spitzbergen, were also given by Mr. Brooks. On the satellite's second pass around the Earth a ground transmitter had commanded it to orbit with a 90.5 min period, but internal timer malfunctions caused it to assume a 95 min period. Automatic ejection of the capsule took place on the 17th circuit of the Earth. Believing the capsule to be still on board, the ground controllers had commanded ejection on the 22nd pass.

The discussions at the four technical sessions at the meeting included the following points:

Guidance and Control. The problems involved in attempting a rendezvous of two satellites were discussed by Mr. P. G. Feeleman of M.I.T. Assuming that the mission was to bring together two satellites which were orbiting 20 miles apart at 480 and 500 miles above the Earth, a velocity increment of exactly 28ft/sec must be added to the lower satellite to effect a perfect Hohmann elliptical transfer orbit. A velocity error of 2ft/sec would mean the satellites would miss their rendezvous by a distance of 1½ miles (measured in a radial direction). Assuming the correct velocity increment, but with a one-degree error in direction the satellites would miss by a distance of 40 miles, or twice the original distance apart.

External Environment. According to Mr. C. A. Whitney of the Smithsonian Astrophysical Observatory, observations of the orbital decay of satellites "appear to confirm the theoretical results based on purely mechanical interaction between the atmosphere and satellite." As yet there had appeared no need to invoke electrical and magnetic phenomena to account for decay of a satellite's orbit.

An informative paper by S. F. Singer of the University of Maryland discussed the corpuscular radiation environment of the Earth. The outer (Van Allen) radiation belt had its origin in the Sun and was composed of "soft" electrons which produced X-rays. As such it presented no great hazard to the space traveller. The inner "hard" radiation belt, however, consisted of "very penetrating" protons, and presented a definite impediment to spaceflight.

Mr. Singer suggested the possibility of "sweeping out" the inner belt with a 15ft diameter satellite. The intensity of the belt could be halved in this manner. Another method of removing the dangerous particles was to set off a series of carefully controlled atomic explosions in space. By releasing non-penetrating fission particles, Mr. Singer suggested, these explosions would disturb the Earth's magnetic field, release trapped radiation-belt particles, and dump them into the atmosphere.

Solar flares produced extremely dangerous situations for space travellers. The most recent "spectacular" solar flare had occurred in February 1956 and had caused a twentyfold increase in cosmic ray intensity at sea level. The intensity outside the atmosphere, according to the speaker, may have been 1,000 times greater than normal. The significance of these flares was that, in the absence of shielding, the human tolerance level would have been exceeded by a factor of 100.

Vehicle Design and Recovery. Mr. J. K. Waul of Douglas Aircraft presented a theoretical evaluation of the aerodynamic stabilization of satellites. His paper, in which it was suggested that a 10-30ft diameter balloon (used like a sea anchor) might be capable of providing pitch and yaw stabilization of a small 500 lb satellite, was questioned by several of those present.

George Brandt of the Advanced Research Projects Agency presented a paper on the military applications of satellites, in which he listed the maximum useful payloads to be expected of satellite vehicles in the next few years. These ranged from the 1959 values of 4,000 lb at 300 miles and 1,000 lb at 5,000 miles to the 1964-68 figures of 50,000 lb at 300 miles, 20,000 lb at 5,000 miles and 12,000 lb at 22,300 miles (the stationary Earth orbit).

Propulsion and Trajectories. A paper delivered by two General Electric representatives indicated that ion propulsion was much closer to reality than was generally believed. They reported that a small ion engine was currently undergoing laboratory tests, and that a unit could be ready for "space testing" in two to three years. Advanced ion engines, capable of altering satellite orbital paths, could be ready by 1964 or 1965. The fact that both the ion engine and plasma engine (discussed in another paper) depended upon state-of-the-art improvements in lightweight electrical power supplies was mentioned by the session chairman.

The various papers impressed upon the audience how many really significant unknowns there are in space travel. And it is these unknowns which often cause unpredictable delays and account for many mistakes in attempts to advance the science of spaceflight. Congressman Brooks stated that the U.S. should not be discouraged by mistakes and failures. In emphasizing his point Mr. Brooks remarked, "I would feel better if we were making *more* mistakes (mistakes being synonymous with progress)." Many of the assembled scientists agreed that, with the uncertainties ahead, his chances of feeling better in the future were better than average.

The featured speaker at the May 14 gathering in New York was Abraham Hyatt, assistant director for propulsion, National Aeronautics and Space Administration. Mr. Hyatt's opening remarks concerned the various Government agencies interested in space work. In discussing the rôles of these groups Mr. Hyatt paid tribute to Dr. von Braun and the Army Ballistic Missile Agency at Huntsville.

After giving a brief review of existing booster rockets, the speaker presented details of NASA's forthcoming series of advanced booster vehicles:

Scout. This 80ft long vehicle would have four stages. Capable of placing a 150 lb payload in a 300-mile orbit, Scout had a weight breakdown as follows: first stage, 23,200 lb; second stage, 8,500 lb; third stage, 2,200 lb; and fourth stage, 505 lb.

Thor-Delta. A three-stage vehicle, Thor-Delta had a take-off weight of 106,400 lb. The first-stage engine was a lox/RP-1 unit with a thrust of 152,000 lb. Burning WFNA and UDMH, the AJ-10-42 second-stage engine had a thrust of 7,700 lb. Weight of the Thor-Delta vehicle at second-stage ignition was given as 4,150 lb. An ABL X-248-A3 solid-propellant rocket, with a thrust of 3,150 lb, served as booster for the 510 lb third stage. Able to place 620 lb payloads in a 300-mile Earth orbit (or 270 lb in a 1,000-mile orbit) the Thor-Delta vehicle could propel 40 lb into lunar orbit. Alternatively, 100 lb payloads could be impacted on the Moon.

Atlas-Vega. Although no performance figures on this vehicle were presented by Mr. Hyatt, several points of interest were noted. Both first and second stage engines burned a mixture of lox and RP-1; the second stage had a "re-fire" capability. The Atlas-Vega could put Mercury-type two-man capsules in what was described as a "two-week" orbit.

Centaur. The Centaur, which was to be turned over to NASA on July 1, differed from Atlas-Vega in that its second-stage engine burned lox and liquid hydrogen. The speaker observed at that point that engines utilizing lox/H_2 had not yet been perfected; many development problems were still to be solved.

Saturn. Employing a cluster of eight Thor engines as first-stage propulsion, Saturn vehicles could place 10-15 ton payloads in a 300-mile orbit.

Nova. Mightiest of NASA's booster arsenal, Nova would have a projected take-off weight of 4,800,000 lb. Second stage ignition weight was 1,300,000 lb, while the weights of the third and fourth stages were 370,000 and 150,000 lb respectively. Thrust of the four stages (in order) were 6,000,000 lb, 1,700,000 lb, 320,000 lb and 80,000 lb. Nova could be used to launch 150,000 lb payloads into 300-mile Earth orbits. Other payload capabilities of Nova were: 43,000 lb in a lunar orbit, 20,000 lb for a soft lunar landing, 2,100 lb for a soft lunar landing and return to Earth, and 4,500 lb for a soft landing on Mars.

As one might imagine Nova had a tremendous thirst for fuel: a 60,000 h.p. turbine was required to supply fuel at the needed flow rate of three tons per second.

Mr. Hyatt advised that NASA's space experiments for the future involved the use of five engines. These included the lox/kerosine 1,500,000 lb unit (clustered to give 6 million pounds of thrust in Nova); an 80,000 lb lox/H_2 engine; a 20,000 lb storable rocket motor; a 15,000 lb lox/H_2 booster (now under development at Pratt & Whitney); and a 6,000 lb storable liquid rocket.

DON ADDAMS

Javelins of St. George

PROFILE OF AN ALL-WEATHER FIGHTER SQUADRON

Two Gloster Javelin FAW.7s of No. 33 Sqn. get airborne at R.A.F. Middleton St. George under an overcast sky

"Flight" photographs

FOR No. 33 Squadron, based at Middleton St. George near Darlington and equipped with Gloster Javelin FAW.7s, the wheel of history has in a sense come full circle. When the squadron originally formed, in 1916, it was a Home Defence unit with responsibility for defending the North-East region. It operated principally with B.E.2cs and maintained a number of detachments throughout the area, with the main one at Headley Bar, near Leeds. Now, over forty years on, it is again responsible primarily for the defence of the N.E. region—a parallel which the squadron commander, W/C. Norman Poole, has been quick to see. But "defence" bears a much more scientific connotation when applied to Javelin 7s than when applied to B.E.2cs or even to Spitfires and Hurricanes, Beaufighters and Mosquitoes. Aircraft defending the U.K. in the First World War had to find their quarry (Zeppelins) visually; in the Second World War they had the assistance of radar, but both day fighters and night fighters relied in the closing stages upon visual interception. Nowadays everything in the R.A.F. is, so to say, much more highly mechanized. This applies not only to aircraft but to their equipment, whether for air-to-air interception or detecting submarines. In the case of an all-weather squadron like No. 33, it means that each Javelin and crew is virtually independent of the ground. ("All-weather" applies to interception techniques; normal flying is subject to peacetime safety regulations.) Such independence is a desirable end, because information supplied to the aircraft by control may be suspect; and it is an achievable one because of the equipment the Javelin 7 carries.

W/C. Poole is in the rare position of being a navigator in command of a fighter squadron, his exceptional experience of interception techniques giving him high qualifications for this post. He served some years ago with the U.S. Marine Corps and subsequently with American squadrons in Korea, so is well versed in A.I. equipment produced on both sides of the Atlantic. His was the first R.A.F. exchange posting with the U.S. Marine Corps, and for him it renewed old friendships of wartime days when he helped to instruct U.S.N. and U.S.M.C. aircrew who came to this country to learn night-fighting techniques. In character, too, W/C. Poole seems well suited to command; he has a quiet authority that makes him respected and a dry sense of humour, subtle but not sarcastic. His two flight commanders, S/L. D. W. Smith and S/L. D. P. McCaig, are both pilots.

W/C. Poole describes his squadron's prime rôle as interception, both by day and at night, techniques for this being constantly practised. The Javelin 7s, with their 200-series Armstrong Siddeley Sapphires, are well able to "get up high enough fast enough and far enough out"—the recipe for success in all-weather squadrons. No. 33 was the first squadron to receive this mark of Javelin, from July last year onwards, having been converted by the Fighter Command mobile unit. The aircraft is well liked by the crews: its day-fighter performance is considered superior in many ways to that of the Hunter, while on last year's big defence exercise ("Sunbeam") there was no difficulty in "swatting" the V-bombers.

In defining his unit's function, W/C. Poole stresses mobility as being of equal importance to its defensive capacity. Like the V-bomber squadrons it protects, and the day-fighter units, No. 33 has to learn to move around and operate from foreign soils. Thus recently it went to Germany, and in February-March this year to Cyprus, on the first long-range detachment carried out by Javelin 7s.

When a squadron goes abroad its ground-crew must go too, following after by Beverley or Hastings; and no word of praise W/C. Poole could give was too high for the No. 33's ground-crews—"The real stars," as he called them, adding that it was a pity that some of the glamour which attaches to aeroplanes and aircrew couldn't be brushed off on to their attendant ground-crew. In the case of No. 33, much the same squadron members (continuity of personnel is something to which W/C. Poole attaches great importance) have gone on efficiently and smoothly from A.W. Meteor NF.14s to the far more complex servicing problems presented by Javelin 7s.

The mobility of No. 33 Sqn. leads naturally to a word on its history and present location: for as a former unit in the Desert Air Force, the squadron should by tradition be mobile; and its base, Middleton St. George, is as perfectly sited as a fighter station could be—on the twin assumptions that a potential enemy will arrive from the East, and his speed and height be such that every minute and every mile counts towards a successful interception. ("Scrambling" is as much a part of FAW. squadron procedure as of the day fighters' and V-bombers'. As W/C. Poole puts it, "the scramble is bread and meat to us." Javelin aircrew, however, are somewhat unique; they combine the dash of the fighter boys with the more calculated enthusiasm of the V-force crews.)

On its badge, No. 33 has a hart's head, commemorating the fact that the squadron (in 1930) became the first to operate with Hawker Harts. It was originally a bomber unit, after its reformation in 1929; but in 1938 its rôle was changed to that of a fighter squadron when it equipped with Gloster Gladiators. During the early years of the Second World War it operated Hurricanes both in the Western Desert and Greece (theatres where mobility, in attack or retreat, was constant); then in the later stages, back in the U.K. and operating in support of the invasion of Europe, it had Spitfire IXs and subsequently Tempests: this fact is proudly commemorated at the main gate of Middleton St. George, where stand a Tempest (acquired with great pertinacity from the M.o.S. establishment at Shoeburyness and refurbished on the station) and a Spitfire.

No. 33 Squadron's score during the Second World War was 291 enemy aircraft destroyed in the air, plus ten destroyed and

Past and present equipment: Four of the squadron's aircraft fly over the Hawker Tempest which stands opposite a Supermarine Spitfire at the main gate of Middleton St. George

Starting en masse, No. 33 Squadron's aircraft show off their tail markings "Flight" photograph

Javelins of St. George . . .

27 damaged on the ground. After the war it underwent several swift changes: re-equipment with D.H. Hornets at Singapore, and amalgamation with No. 45 Sqn.; re-formation in October 1955 at Driffield, when it assumed the all-weather rôle with D.H. Venom NF.2s; disbandment at Driffield (January 1957); then a new existence when—on October 1, 1957—its number was given to No. 264 Sqn. This unit, equipped with A.W. Meteor NF.14s, had been an A.W. squadron nearly all its life; it was temporarily detached to Leeming because the runway at Middleton St. George was being serviced. Thus No. 33 continued in the all-weather rôle; and before it left Leeming for its present base received its standard from Air Chief Marshal Sir Philip Joubert, its first C.O. (in 1916), at a ceremony attended by 13 former commanding officers—a splendid token of loyalty for "Thirty-three."

The squadron now shares the facilities of Middleton St. George with a Hunter F.6 day-fighter unit, No. 92 Sqn. The station, which is commanded by G/C. A. V. R. Johnstone and is reckoned to have the smoothest R.A.F. main runway in the country next to Coltishall, dates only from the beginning of the last war. From 1942 to 1945 it housed R.C.A.F. bomber squadrons, then for some years had a variegated history—as O.T.U., air navigation school and advanced jet flying school—before becoming an operational station in No. 13 Group of Fighter Command. In November last year Middleton St. George got its badge, appropriately depicting the saint's sword and also a Canada goose, the latter symbol having a dual implication because of the wartime R.C.A.F. associations and the old name of the area in which the station stands—Goosepool. Close by the airfield—which when the wind blows from the east suffers from Tees-side smog but in other respects forms an ideal base—runs the Stockton to Darlington railway line, one of the first in the world. It is interesting to speculate what George Stephenson, that pioneer of locomotion, would have thought about Hunters and Javelins.

At the time of *Flight's* visit to No. 33 Sqn., frontal weather conditions were affecting Middleton St. George and the prospects for successful air-to-air (or even ground-to-air) photography looked bleak. Nevertheless the squadron put up a box of four to do take-offs and landings in pairs, and low-level formation runs over the station; and in the afternoon its aircraft were airborne for air-to-air studies (see *Flight* for May 8, page 637). These formations were led by S/L. Smith and in the afternoon he had W/C. Poole as navigator. It was a splendid effort considering the weather conditions and the fact that Javelin pilots are more used to working as individual teams, with their navigators, than in formation. The FAW.7s of No. 33 Sqn. bear the squadron's markings, horizontal dark blue, light blue and red stripes, across the Javelin's fin. These colours commemorate the squadron's R.F.C. connections, and may be said to symbolize its old function —that of home defence—maintained currently with new techniques and far-reaching defensive equipment. H. W.

STARTING THE SEASON

Displays—and Big Crowds—at Hucknall and Yeadon

WHIT-MONDAY is to the air display season what August 12 is to the grouse-shooter; and aeronautically things got off to a fine start a week last Monday with big shows at Hucknall, the Rolls-Royce airfield near Nottingham, and at Yeadon, the Leeds-Bradford airport. These displays were organized respectively by the Royal Air Forces Association and the Soldiers', Sailors' and Airmen's Families Association; each had a good attendance (an estimated 40-50,000, though at the time of going to press official figures had not yet been worked out); both areas had reasonably fine weather, though there was some lowish cloud and a strong breeze (too strong for the Blackburn monoplane at Yeadon and causing a postponement of parachute drops at Hucknall) and Yorkshire had some rain which Nottinghamshire was spared; both shows shared the majority of their turns, perhaps on the principle that good things are better shared.

Good things there were indeed, in plenty, with participation from both R.A.F. and U.S.A.F. Under their new commander, S/L. Peter Latham, No. 111 Squadron seem to be maintaining their impeccable reputation and have added some pleasing new moves. These include "wine-glass" and "voodoo" formations, from the latter two aircraft breaking away (streaming smoke) to leave seven. Then, like the nigger boys or the green bottles, two more depart and the remaining five go into line abreast, then form fork, box, card-five and arrow shapes before breaking away downwards. The four early-leavers then reappear and break away upwards, providing a splendid finale to this well thought-out, excellently led and splendidly executed show.

Treble-One Squadron, like other members of the R.A.F., had a busy time between Hucknall and Yeadon. Their fellow commuters included F/L.s J. Rhind and P. J. Hirst of the Central Flying School, Little Rissington, who gave a very pleasing exhibition of synchronized aerobatics in their red-and-white jet Provosts; F/L. D. F. Moffatt, holder of the Wright Jubilee Trophy (presented by the R.A.F.A.), demonstrating how neat a performance the R.A.F.'s current aerobatic champion could put up in a Vampire; a Beverley of Transport Command trundling in (the largest aircraft ever to land at Yeadon) and departing steeply with 70 parachutists of Nos. 12 and 13 Battalions, T.A.; three Javelins of No. 151 Sqn. passing over very fast (with a pat on the back from the Hucknall commentator for W/C. R. F. Martin, Gloster chief test pilot, who was there to fly the Bristol Fighter); and two Vulcans of No. 83 Sqn. making what seemed to be a leisurely passage across the airfield, their graceful proportions deceptively masking their formidable bulk and high speed.

Not only the R.A.F. commuted between Yeadon and Hucknall, however. Other birds of passage were Leon Biancotto, that incredible Frenchman whose antics in his red Bücker Jungmann, with its black-checked control surfaces, smack of the good old exciting days of barnstorming; Jeffrey Quill, who in the Spitfire QJ-J is a kind of Jessie Matthews "evergreen" of the air displays, continually and consistently delighting his audiences; and the U.S.A.F., who showed off an F-100 and F-101A, as well as an air-to-air refuelling with these aircraft plus a B-66 attached (or simulating attachment) to a KB-50 tanker.

Both the neighbouring university air squadrons, Leeds and Nottingham, performed at Yeadon and Hucknall respectively with excellent deportment despite the gusty conditions and gave solo Chipmunk items (F/L. McCann and F/O. Law); and each display had its "exclusive" turns. Two of these were provided by the Shuttleworth Trust, those exemplary custodians of famous aeroplanes: at Yeadon, the Blackburn monoplane of 1912 vintage (which, as mentioned, could not fly because of the 12-knot wind); and at Hucknall a nostalgic dog-fight between the Bristol Fighter and the Sopwith Pup, flown respectively by "Dickie" Martin and "Doc" W. Stuart. Yeadon had a Blackburn B.2, flown by D. J. Whitehead; and a second Beverley, on static show (its crew, having arrived complete with car, went off for a tour of the Pennines). Hucknall had a second Chipmunk aerobatic display, by Barry Radley; glider aerobatics in a Sedbergh by F/L. R. C. Jones; a delayed parachute drop by four members of the Sky Divers Club—under two white parachutes, one red-and-white and one buff, opening being delayed up to 18 sec; and the Army Air Corps disporting in an Auster and EP.9.

There were helicopters at both displays, a Skeeter and Dragonfly from the C.F.S. helicopter squadron convoluting skilfully, and at Hucknall a B.E.A. Whirlwind doing a steady trade in pleasure flights (as also did Derby Aviation in their Dakotas). In the middle of the Yeadon display, a Whirlwind of No. 22 Sqn. arrived from Bangor in North Wales with a patient for Leeds General Infirmary. This, as our correspondent writes, was "a chastening and timely reminder that the helicopter plays its part in the life of the community—quietly and unobtrusively." The flying finale at Yeadon was by No. 111 Squadron, who had refuelled at Waddington after performing at Hucknall. They helped to make the display, as one senior member of the Yorkshire Aeroplane Club put it, "the finest we have ever had at Yeadon"; and the same kind of superlative could justly be used to describe the show at Hucknall.

THE INDIAN AIR FORCE

An Appraisal of a Commonwealth Air Arm

By ALASTAIR PUGH

PART I

FROM Dalhousie on India's mountainous northern border, skirting the craggy Himalayan snows, to Cape Comorin on the placid southern coast is 1,700 miles. From the plains of Kutch in the west the land stretches brown mile upon brown mile for more than 1,300 miles to the mouth of the Ganges and the eastern frontier beyond Calcutta. The area in between—the pastures and rice paddies, rivers and hills, jungles and mountains, lakes and parched desert—covers a million and a quarter square miles.

The aerial defence of this land of 370 million people, speaking many languages, practising a multitude of religions, is the trust of the Indian Air Force.

Last year, from humble beginnings in 1933, the I.A.F. celebrated its silver anniversary—25 years in which it has grown from a single squadron (equipped with four Wapitis patrolling the North West Frontier province) into an air force in its own right. In equipment, its jet fighters and bombers are the equal of any in service with a Commonwealth air force; in size, the I.A.F. is certainly the largest air force in South-East Asia; and in spirit it is imbued not only with traditions formed in training and action alongside the Royal Air Force, but also with something of the restless striving for improvement that is abroad in India today; a spirit that the Chief of Air Staff has attributed to unity and national zeal.

Although in the six years between formation of the Indian Air Force and the outbreak of the Second World War the embryo force grew in strength and character (some of the present senior officers have served from the earliest days) it was not until war came that any real expansion took place. Then volunteer reserve flights were raised in the coastal towns of Madras, Bombay, Calcutta, Karachi, Cochin and Vishakapatam. By 1942 the strength had grown to seven squadrons, and a year later, when the I.A.F. had seen action in Burma with its Hurricanes, to nine. In the following year, 1944, the I.A.F. was granted the royal prefix, and it remained as the Royal Indian Air Force through the year of partition in 1947 until 1950 when India became a republic.

Always well equipped, the R.I.A.F. had acquired its first jets—Vampires—as early as 1948. They supplemented and later replaced the Hawker Tempests and Spitfires that were the standard fighters up to that time. With modern equipment going into use, the Service was reorganized into Commands; Air Force Academies and a Flight and Technical Training College were established; and navigator training and all-through training schemes were introduced.

This was perhaps the basis for the I.A.F. of today, for since then new Commands and new Flights have been formed and aircraft equipment has been progressively modernized. Thus in 1953 two-seater Vampire T.55s and Toofanis—Dassault Ouragans—were introduced, in 1954 the first C-119 Packets were added, and in 1957—in the biggest re-equipment programme yet, confirming India as the U.K.'s best customer—the I.A.F. acquired Canberras, Mystères and Hunters. Soon it is to have Folland Gnats.

Only once since the end of the Second World War—in Kashmir in 1947, just after partition—has the Indian Air Force been required to go into action. In fact the record of achievement over the past ten years is a remarkable one of goodwill missions and of the relief of suffering: every year since the I.A.F. became large enough to contribute effectively to such work, mercy missions have featured in the year's activities—supply drops and reconnaissance in flooded areas, the location of fishermen marooned off the Madras coast; medical supply drops to stricken areas, relief supplies ferried to Egypt and Hungary; food flown in to Himachel Pradesh in the Himalayan foothills. Recently relief work and assistance on a fairly large scale was extended to a badly flooded Ceylon.

The offensive potential of the Indian Air Force is invested mainly in Canberra B(I).58s, one of which is seen above at the start of a sortie. Other marks of Canberra are used for interdiction work, training and aerial survey, much of it over the Himalayas

My introduction to the I.A.F. occurred at what, potentially, must be one of the most romantic locations that could be devised for an air force station—Agra, famed for the Taj Mahal and the historic red fort of the Mogul princes.

G/C. K. S. Bhat is the station commander at Agra. When we met first on a quiet evening in the I.A.F. mess, just after I had seen the Taj for the first time—bathed in brilliant moonlight—our conversation was not of the life and work of the squadrons but of the *mystique* of India. With W/C. Z. Shah, the liaison officer during my tour, we talked, I remember, of Paul Brunton and his book *Self and Overself*, of the three stages of Yogi, and of such strange phenomena as the ability of the *guru* to balance an egg on its point, and the man in Delhi who was recently sealed in a box of nails for 48 hours. It was not a conventional introduction to an air force, but it was certainly a very interesting one. We touched on something of the remarkable contrast between the centuries-old India—a land of princes and peasants, thinkers and teachers, maharajas and men of mystery—and the India of today, vital and resurgent but as yet barely touched by industrial development, and the responsibilities that the Indian Air Force undertakes in moulding and training its officers and men into an efficient force capable of flying and maintaining advanced equipment in an often difficult environment.

In the past, the I.A.F. relied on the R.A.F. for its training, but the possibilities of progress towards self-sufficiency in this direction were limited; technical and flying training for I.A.F. officers in the United Kingdom is now being limited to a stepping stone to training at home. While undoubtedly grateful for the warm and continuing co-operation of the R.A.F., the I.A.F. is determined to make the interdependence of the two services a two-way affair. Its first offering (already started with the Gnat) will be in aiding the tropical development of the aircraft it operates; later the construction in India of indigenous jet trainers and fighters should contribute design and operational knowledge to the Commonwealth pool.

Just as Australia has provided a home for missile testing, it could be that India might one day become the proving ground for tropical flying. The present experience is that there is still a good deal to learn; certainly protracted operation in monsoon weather has taught some important lessons in the design of airframes and equipment. No doubt lessons have also been learnt in introducing Canberras and Hunters into an air force that until recently has relied on a few British-trained air and ground crews for the sum of its experience. But more than a year has passed since the first of these aircraft arrived; and, as always, first-hand experience has brought increased efficiency.

The first Canberras were delivered in November 1957 and the

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I.A.F. seems very pleased with them; almost reluctant, I thought, to criticize what, by nature, cannot be perfect. There have been some severe internal temperature problems to be overcome and dust and monsoon rains have also brought difficulties in their train; but, in general, satisfactory service is being obtained and active steps are being taken to overcome remaining environmental malfunctions. At one station I visited, three units—a bomber conversion unit, a survey and reconnaissance unit, and a light bomber squadron—had homes around the airfield perimeter and the latter two units were rapidly working up to full operational status. Before the Canberras arrived, I.A.F. engineering officers spent six months in the United Kingdom with English Electric and Rolls-Royce, and a nucleus of aircrews and ground staff were also trained in Britain; these included all the instructors of the Canberra conversion unit. Some of the aircraft were flown out by Silver City Airways pilots, but Indian crews returning from a Canberra conversion course ferried-out others, and the great range and excellent high-altitude performance made light work of the 5,000-mile delivery flight.

From S/L. Agtey, who commands the bomber conversion unit, I learned of the progress that is being made in conversion training. The unit was formed in May last year and operates a mixed bag of still very new-looking T.4s and B.58s, the syllabus generally

(Upper left) Standard I.A.F. heavy transport is the C-119 Packet; here air dropping is demonstrated by an aircraft engaged on an exercise

(Left) Now largely superseded by Mystères, Dassault Ouragons (Indian name, Toofani) still form part of the Commonwealth defensive force

(Below) A pattern of aircraft servicing to suit local needs has been developed by the I.A.F. for their Hunter 6s

(Right) A photograph that hardly needs a caption—a "fearful symmetry" of hand and eye expressed by the Shah Jehan's Taj Mahal and I.A.F. Canberra B(I).58s

conforming at this stage very closely to the R.A.F. pattern.

The first crews to be converted entirely in India started their three-month course towards the end of August last year. Selection of pilots and navigators was based on previous experience. Of the pilots, those without jet experience had rather more total flying time. The idea was to balance out the pilots' initial capabilities against their probable aptitude, and it has worked out well.

A month of intensive ground study is followed by two months of conversion flying, some of which is at night. A white (jet) rating is considered an essential part of the course, and at least six hours are devoted more or less exclusively to obtaining the necessary experience. At the end of the two months the course is assessed by an instrument-flying examining board; there is an aircrew examining board as well in the I.A.F. (formed in 1956) but the Canberras are as yet too new for all the examiners to have received conversions themselves.

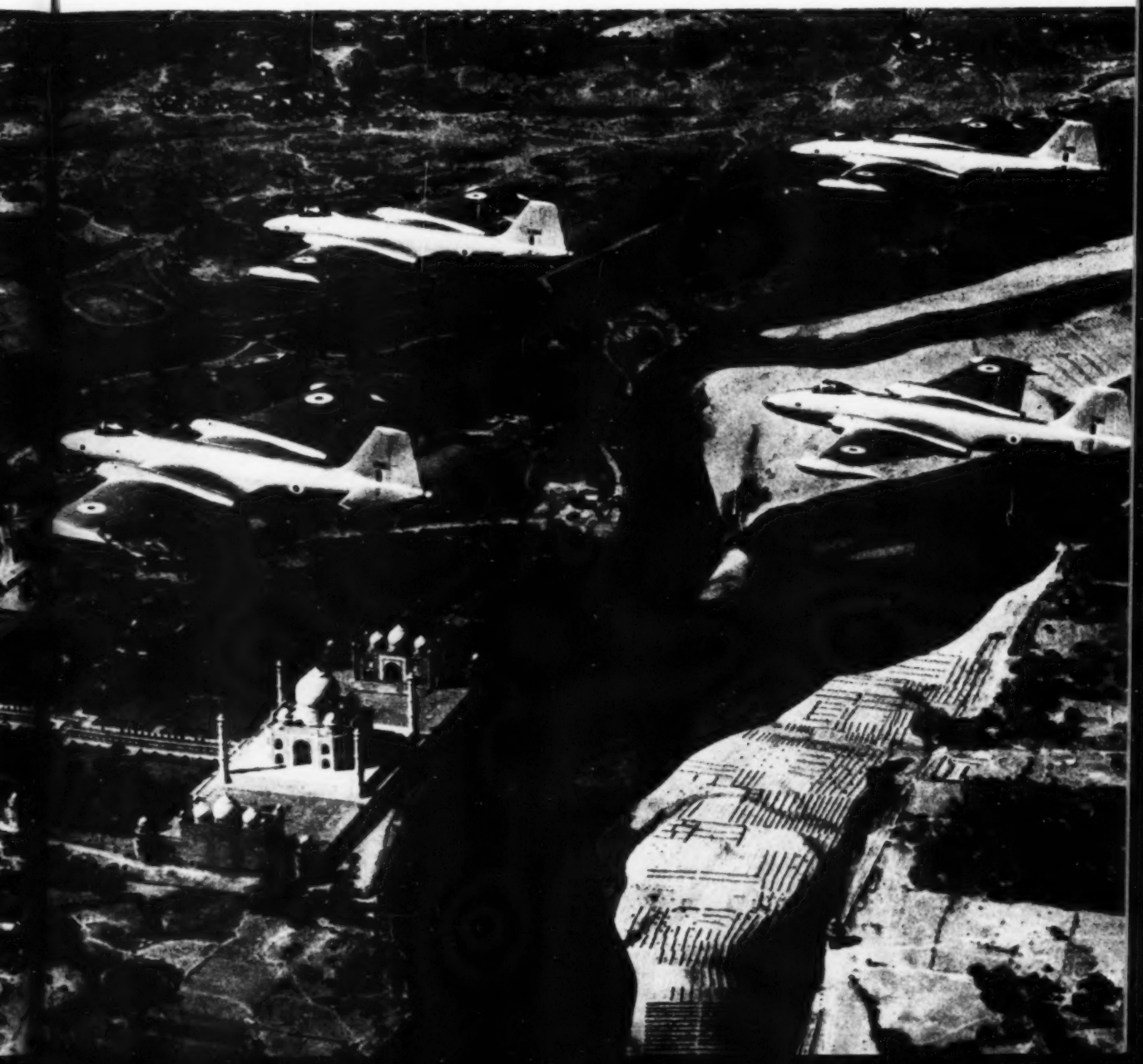
During all the training exercises (often after cross-country flights lasting nearly four hours) let-downs are made by radio compass and V.H.F./R.T., the sole airfield radio aids available in India. Nevertheless, at 40,000ft the M.F. beacons can be received at a range of 300 miles, and are apparently little affected by static interference except in the first storms of the monsoon. But instruction is given in other ground-based aids used overseas.

The L.B. squadron received their first aircraft in April 1957, and last year was an introductory one in which the potentialities of the aircraft—Canberra B(I).8s and B.58s—were fully explored while the two flights were worked up to operational standard. Exercises have been limited to one day of fleet support sorties when the Indian Navy was returning to Bombay, but this year it is intended to operate a full-scale summer exercise.

W/C. Dani, the C.O., expressed himself very satisfied with the results so far achieved in the high-level bomber rôle. Bombing techniques are practised both by day and by night, visual and blind, in every condition of weather. Using the self-contained navigation aid (it has been stated that Marconi Doppler AD.2000 is installed in R.A.F. Canberras) and a two-crew operation, this squadron has consistently achieved very good results.

On another side of the airfield, an S.R. unit (commanded by W/C. Bhimrao) is providing valuable service with its Canberra P.R.7s and vertical cameras. In the flight commander's office, standing in front of a giant-sized wall map of India, I was treated to an enthusiastic discourse on the survey work that the Canberras are doing. By no means all of India is as yet accurately mapped, and the photographic reconnaissance unit is hard at work filling in the gaps. Mapping the whole area of the Himalayan range, which covers 50,000 sq miles, is Canberra-sized work; and so far 14,000 sq miles have been mosaic-photographed and many corrections have been made to existing maps compiled from travellers' reports. Because of the inaccuracies of these maps pinpoints are extremely difficult to obtain; already the unit has discovered the existence of a hitherto uncharted 320-mile-long lake in the Himalayan region.

[*Continued overleaf*



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Extreme navigational accuracy and very precise flying are required for each photographic sortie. Working from a known pinpoint, navigation to the start of each run is made by dead reckoning and by the Canberra's self-contained navigation aid, and then timed turns are made during each 4 n.m.-wide photographic swathe. Making some seven to ten runs on each trip, while flying at 45,000ft in outside temperatures of down to −90 deg C becomes a cold and protracted business and much thought has been given to improving efficiency under these conditions; even the mildest men develop short tempers towards the end of each exercise. Nor can there be any let-up in flying precision if good results are to be obtained; speed must be maintained constant to within ±5 kt and height to ±100ft; angle of bank must never exceed ± one degree.

I was interested to learn that, over the Himalayan peaks, ground turbulence effect extends up to the photographic height of 45,000ft. This, and the still-air turbulence that is occasionally encountered, make the crew's task an exacting one. But there is obviously an exhilaration to this mountain flying that breeds a high degree of enthusiasm among the Canberra crews—a spirit that is supplemented by great confidence in their equipment. The Himalayan range is perhaps the world's most unfriendly terrain over which to experience mechanical trouble; but the only incident to occur in many hours of flying—a flame-out on one engine over Mt. Everest on Christmas Day 1957—ended quite happily with the Canberra arriving over base still very nearly at its sortie height.

Mapping desolate areas tends to be a business of extremes. Apart from their Himalayan work, this unit previously undertook a survey of 50,000 sq miles of India's Rajasthan Desert for the National Development Council, who were investigating the incidence of oil in this waterless area. Once again, existing maps were inaccurate and navigation had to be by dead reckoning.

Before I left the Canberras G/C. Bhat showed me the extensive parachute training school (trainees from foreign air forces, including senior officers, are regularly accepted) and we also visited the courier squadron which operates C-119 Packets. These aircraft are kept fully occupied for crew training (using U.S.A.F. familiarization techniques but R.A.F. categorization) and as transports. Regular courier flights are made to the United Kingdom to fetch urgently needed spares, and as transport (albeit not of the most luxurious kind—though mess talk has it that night stops in London and Paris bring some compensation for I.A.F. personnel).

After this, a trim I.A.F. Devon flew us to a fighter station adjacent to a pleasant little town. Hunter 56s are in service and this type forms the standard high-altitude fighter of the I.A.F. The pilots I spoke to said they had enjoyed their time converting to Hunters in England, but slightly preferred to visit R.A.F. units for their flying rather than the essentially civilian (though very comfortable) atmosphere of Dunsfold; swapping common experiences with the R.A.F. was an opportunity to be treasured. Some of the officers who are now responsible for supervising conversions had, while in England, attended the day fighter leader course.

After some initial heat and humidity difficulties had been overcome, the Hunters have settled down very well to life in India (the R.A.F. and I.A.F. exchange reports on operations under tropical conditions). The cockpit air conditioning system is particularly popular, and a stand-by system is also available—quite an important consideration in sun temperatures of 116 deg F.

The process of Hunter conversion occupies many hours' flying and an extensive syllabus must be completed before a squadron can be considered operational. Exercises covered in this period include handling, instruments, navigation, tactical formations, weapons training (both theoretical and with live ammunition), interceptions and offensive sweeps, and strikes. Once operational, the squadron has a continuation training syllabus of its own to follow. Highlights of this are ground-controlled interceptions and a three-month visit, under canvas, to an armament training wing.

On this excursion the squadron moves *in toto*, the aircraft being serviced in field conditions under canvas. The course itself has no exact equivalent in the R.A.F.; it is somewhere between the pilot attack instructor's course and "mere shooting practice", but it gives valuable training in mobility and has presented some pressing problems in keeping the aircraft serviceable. Normally second-line servicing is done on the station, but when the squadron moves it is found impracticable to take more than the absolute minimum of ground servicing and armament equipment if mobility is not to be impaired. In India considerable maintenance is done on the squadron and the amount of tools, spares and other equipment considered right for the R.A.F. has had to be adjusted to local requirements. Category B repairs are undertaken by a local R.S.U. but another unit undertakes more extensive repairs.

An informal air-to-air study of W/C. Zafar Shah, the author's liaison officer during his tour of I.A.F. units

"Flight" photograph

G/C. S. A. Hussain, the station commander, was proud of the rapidity with which the squadrons had mastered their Hunters; flying began in early January of last year, but by January 26 they had taken part in a fly-past, a formation team gave a demonstration on February 1, and in April two formations of five took part in the twenty-fifth anniversary celebrations on Air Force Day. With only two months of experience a fire-power demonstration was given.

There is no official aerobatic team of the Indian Air Force, but there is a great deal of enthusiasm for formation aerobatics (a formation of nine has been flown) and plenty of support for the idea that a team should be formed. Many pilots have followed the development of S/L. Topp's 111 Squadron manœuvres very closely and I was anxiously pressed for my reactions to the formation of 22 aircraft at Farnborough.

A typical day on an Indian Hunter squadron begins at 0700 hr, with an intensive pre-flight briefing by the flight and squadron commanders on the day's first exercise, which begins by 0800. Element leaders are briefed first, and they then brief the individual sections. Typical exercises might be concerned with instrument rating practice (S/L. Macneil, a squadron commander, holds a master green and is naturally keen on proficiency in this respect); or QGHs (controlled descents in snake) on the AD.200 which all the aircraft carry.

Flying normally continues until the early afternoon, the last aircraft landing at about 1500 hr, which in summer is the full heat of the day—and very, very hot. In answer to my question as to how operational efficiency could be maintained in action, I was told that the problem was tackled by conducting a fifteen-day summer exercise, deliberately designed to investigate—and to tax—squadron efficiency. In temperatures of over 100 deg F, reached in summer by mid-morning, it is difficult even for natives of the country (I was rather naïvely surprised to learn) to concentrate on any problem for very long, and the extended summer exercise is a deliberate, exhaustive and exhausting test of the Service's ability to triumph over environment.

Another matter of particular interest was that everybody finds that the workaday round sometimes palls—and squadron pilots are certainly no better than anyone else in this respect. But the I.A.F. is determined that each man shall know his aircraft intimately, so theoretical training (range and endurance flying, meteorology, instruments, tactics) is supplemented by equal amounts of practical "dirty-hands work" in the hangar.

Through their flight commanders, who are responsible for the daily servicing section of each Flight, pilots are made respon-

"Flight" photograph

The Bhakra dam, seen from the right-hand seat of a Vampire trainer. This is one of many civil engineering projects currently being undertaken

Pictured here are the largest and smallest aircraft for the Indian Air Force—a Mk 1 Gnat (complete with engine) being loaded into a Fairchild Packet. Gnats and Orpheus engines are to be built in India

sible for the daily inspection of their aircraft (engineering officers are concerned with repairs and servicing) and are encouraged to spend as much time as possible watching and working with the airmen and N.C.O.s who are doing line servicing, until they know—by sight and by touch—every routine operation that maintenance involves.

Apart from the obvious advantages that this scheme brings, it also offers some solution to a problem endemic to all air forces: how to bring pilots, as commissioned officers, in contact with the men serving under them. It is unlikely, of course, that the scheme could be continued when the squadron was in action, but by then there would be a nucleus of very well trained officers capable of dealing with day-to-day maintenance problems as they arose.

In India, the winter tropopause extends from 52,000 to 56,000ft and in summer up to 58,000-60,000ft, so that the I.A.F.'s aircraft are operating at altitudes where temperatures are still dropping: they may in fact reach a stable minimum of −90 deg C. Such a temperature is still very difficult to simulate on the ground, and very few cold-chambers can be brought down to this level. Yet although few components are designed to work at these extremes, in practice failures have been relatively few. Where the challenge lies is in providing a cabin conditioning and heating system that will accept not only wide variations in temperature, but also very rapid rates of temperature-change. Certainly remedies can be found, and in the Hunters a solution seems to have been reached, although naturally they are not exposed to the same cold-soak as a Canberra on a high sortie lasting several hours.

An English-type lunch in the cool station mess completed my two visits to fighting units of the I.A.F. In a service Dakota—neatly and skilfully modified by Hindustan Aircraft as a navigational trainer, with half a dozen plotting tables, repeat sets of basic instruments and the three astrodomes for use by pupils taking astro shots—we flew south for more than three-quarters of the length of India to see something of the training that lies behind the smartly efficient squadrons of fighters, bombers and transports. *(To be continued)*

A.R.L. QUARTER-CENTURY

FOR the past 25 years most British aircraft constructors—and a good many abroad—have known the Duxford, Cambridgeshire, firm of Aero Research Ltd., first under that name and latterly as CIBA (A.R.L.) Ltd.; and they have recognized it as one with a strong individuality, which undoubtedly stems from the fact that it began life as a pure-research institution.

On Thursday of last week the company entertained nearly 150 of its friends in industry, Government departments, research establishments and so forth, at a dinner celebrating its silver jubilee. Among the guests were the Swiss Ambassador; Dr. Käppeli, chairman of the Swiss parent CIBA organization (which acquired A.R.L. in 1947); and Dr. H. B. Marshall, president of the American CIBA company.

Dr. N. A. de Bruyne

Preceded by a splendidly organized programme which had enabled the guests to see the works both from inside and (with the aid of a chartered B.E.A. Whirlwind) from above, the dinner was all that such occasions should be, though there was one clearly audible note of disappointment; it came when Dr. N. A. de Bruyne, the company's founder, made the surprise announcement that in 1961 he will not seek re-election as managing director. He has agreed to remain on the Board, and Mr. R. F. G. Lea, the present commercial director, will succeed to the managing directorship.

In a characteristically witty and erudite speech Dr. de Bruyne recalled the formative years of Aero Research, when its activities included the building of the Snark, a low-wing cabin monoplane with a Gipsy Major engine. Today, he said, the opening of the new research laboratories had brought up the total research staff to 84, apart from 26 in the technical service laboratories: "Dr. Webb, formerly Fellow of Trinity Hall, has joined us as director of research and increased the research staff with seven Doctors of Philosophy, with seven graduates and seven assistants. It may be that those who, like me, occasionally drop into the labs to borrow a corkscrew are puzzled by the camp beds and the notices exhorting the reader to leave things as they are; but these are in fact signs not of indolence but of activity."

In a reference to the technical Press Dr. de Bruyne spoke appreciatively of the fact that at least in this country a contribution of real interest was treated on its merits in the editorial part of the paper irrespective of the size of the firm. He added, "My advice to all is—take the Press into your confidence; and I would add that I have never known a journalist abuse a confidence."

Other speakers were Dr. Käppeli (who paid tribute to Dr. de Bruyne's leadership of the A.R.L. team) and Sir Arthur Vere Harvey, M.P.

Afterwards the new buildings were declared open by Dr. Käppeli. There were fireworks, and the buildings were floodlit, with music and commentary on the *Son et Lumière* principle. They consist of a new 16,300 sq ft plant for the production of Araldite epoxy-resin adhesives; a new research block; and additional wings, including a showroom, to the sales offices. The principal existing sections of the factory, apart from laboratories, consist of plant for the manufacture of urea-formaldehyde and melamine-formaldehyde resins, and a workshop engaged on the development and production of Redux-bonded structures, principally for the aircraft industry. Here some typical specimens were on show, including Comet and Argosy components and also examples of Aeroweb metal honeycomb.

The new Araldite epoxy-resin plant. In the background is the plant in which Aerolite glue is manufactured

RETROSPECT

From "Flight" of May 29, 1909

Phantom Airships and Scare Headlines: An absurd degree of credence has been accorded by a certain section of the daily Press during the past week or two to what were evidently ridiculously exaggerated statements that emanated from various parts of the country concerning the appearance of mysterious airships by night. Clever though the ruse has been, it was evident from the very first that either a practical joke was being played or that a bold advertising scheme was on foot. The lengths to which speculation of the wildest kind were allowed to go was neither beneficial to the new industry nor calculated to enhance the dignity of the British public in the eyes of foreign nations. Apart from that, however, the game played with illuminated toy balloons of orthodox cigar-shape, towed by cars, in the still watches of the night, was well conceived from an up-to-date advertiser's standpoint, and was carried out with conspicuous ingenuity and adroitness, while apparently a well-known firm of automobile engineers may be suspected of deep complicity in it . . .

AVRO VULCAN B.2

(Four Bristol Siddeley Olympus 200-series)

Span	111ft
Length	97ft 1in

Owing to its all-white finish the Vulcan B.2 is best portrayed against a dark background, as in this drawing depicting the second production B.2, complete with its Blue Steel stand-off bomb suspended beneath the fuselage. With the Victor B.2 this mark of Vulcan will form front-line equipment for Bomber Command for several years to come; both aircraft promise to have outstanding range, speed and altitude performance

"Flight" copyright drawing by D. I. Punnett

Round France on Business

"Flight" photograph

1,600 Nautical Miles by Gemini

By MARK LAMBERT

THESE are some notes on a business trip round France which I recently made in *Flight's* Gipsy Major-engined Gemini, G-AKHC. I used I.C.A.O. 1 : 500,000-scale maps, flew V.F.R. all the way, and calculated in nautical miles and knots, although the A.S.I. reads in m.p.h. The last joint of my little finger is 7 n.m. long on this scale and I carried a pocket slide-rule giving sine values for drift calculation and a five-inch scale down one edge. Still-air cruising speed was just under 120 kt —two n.m./min—and I marked every 20 n.m. along my pencilled tracks. I had about 15 V.H.F. channels, but no navaids as such.

The important point is that I was able to do a full day's work every day, sleep in a comfortable bed every night and still cover my 1,600 n.m. in a week. Each landing, except at Le Touquet, was made to keep a business appointment. A table overleaf gives some general figures for the trip.

Sunday. *Croydon - Toussus le Noble. Route: Tonbridge, Hastings, 4m. E. of Dieppe, Toussus. Distance, 180 n.m.* Sunny weather with haze and favourable wind. Sea-crossing of 30 min in haze, virtually on instruments until I climbed to the haze-top. Land-fall 2 n.m. E. of track. Visibility deteriorated to less than a mile before suddenly clearing at the Seine over Les Mureaux. Toussus like a seaside resort and teeming with aircraft.

Monday evening. *Toussus - Bordeaux/Mérignac. Route: straight line. Distance, 260 n.m.* Jacques Noetinger, well-known French pilot and author of excellent new book, *Un Pilote Quelconque*, accompanied me to Bordeaux. He obtained clearance and met. forecast while I warmed up engines. Estimated 20 min of daylight to spare at Bordeaux and reckoned on a headwind and 3,000ft cloud-base for the first part, clearing to sunshine and calm. In fact we made a ground-speed of just under 100 kt all the way (regularly checked by slide-rule and watch) and the visibility deteriorated steadily. Arrived at dusk. Exhaust flame from the oil refinery on island in Gironde made useful pin-point. Airport beacon seen from seven miles. Wind on landing 23 kt almost down the runway.

Tuesday evening. *Bordeaux - Marignane. Route: Toulouse, Castelnau, Béziers, Montpellier, Marignane, substantially following the Garonne, Midi Canal and Mediterranean coast. Distance, 292 n.m.* Of the alternative routes following the broad valley past Carcassonne or the narrow one to the north past Mazamet, I chose the former because it added only five miles to the distance.

Bordeaux met. said there was an occlusion east of Toulouse giving favourable winds, but low ceilings with intermittent rain for the first part of the journey and a possibility of 400ft ceilings in rain in the valley. After that they warned me particularly of severe turbulence and vertical gusts in hilly areas with a *tramontane* blowing down from the Lespinous mountains to the Mediterranean and a strong *mistral* coming out of the Rhône valley. But cloud cover would substantially disappear in this area.

They were dead right. I took off in dull weather and flew in dreary rain past Toulouse. The landmarks were excellent but weather became more and more stormy, with heavy showers. The rising hill-tops began to disappear in cloud. Some time after I entered the broad valley I found heavy showers ahead and to the left but could see the Pyrenees rearing up in bright sunshine 30 miles to the south.

Slight détour past Carcassonne. The architecture is already distinctly southern, with pale houses and thick red-tiled roofs. The sun beckons just past that last disgusting storm. Ground-speed now well up at 130 kt.

But the turbulence becomes uncomfortable. I struggle for some minutes to extract my camera from my case on the back seat, take light measurements and shoot a few pictures of that last storm while I fly with my knees and the Gemini bucks crazily about. Then I climb to 7,000ft and into smoother air. The Mediterranean coastline opens up before me and, allowing still some 15 deg drift, I only bother to plot ground-speed as I follow the coast. The Med. looks angry. Partial cloud cover appears; climb over the first two steps to 9,500ft and then go through it intermittently until I turn south-east over Montpellier for the last leg. I throw away my maps when I see Marignane from 50 miles. Ground-speed now steady at 136 kt.

Let down at the last minute to avoid the turbulence of the *mistral* lower down, call Marignane and land in a warm, blustering 25 kt wind. Stop immediately, but told to continue to end of runway, so I take off again and fly there. Finally, I park in front of a huge two-bay concrete hangar in a warm Mediterranean twilight. Despite the sound of my engines no one appears, so I get out and walk around. Still nothing stirs. The lights of the main parking apron are a mile away across the long, parallel runways. Finally I find a very small door in the hangar and knock. A nervous French voice calls, "Qui est là?" without opening. Suddenly the complete futility of the situation strikes me. I've dropped from the sky to this vast dead hangar in a warm gale. What on earth can I say to identify myself to this disembodied voice? Then its owner opens the door as he finishes buckling on his revolver. A second guard watches me while the first makes innumerable, midi-accented telephone calls on a rustic instrument. But at last everything clicks, the Gemini is dragged under the shelter of an F-84F on the vast hangar floor and I retire to a pleasant hostelry in Marignane village.

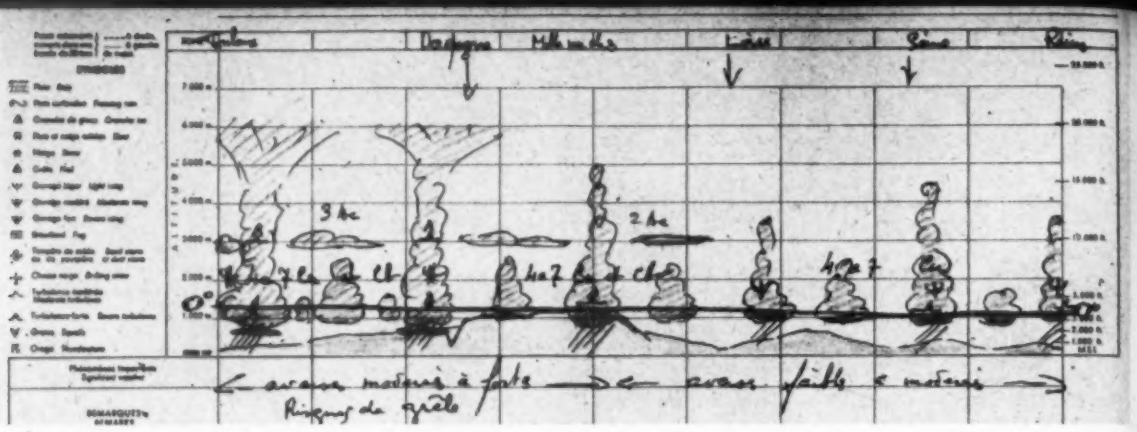
Wednesday afternoon. *Marignane - Istres. Distance, 15 n.m.* The *mistral* rises again soon before take-off. A ten-minute hop across the Etang de Berre and I struggle with Istres Tower radio, but the area is notorious for *parasites* (static) and I cannot read a word. Presuming on the *mistral* I land northwards on the immense 18 km main runway, only to find the wind fully across. No joy at all on the radio, so when I see two Noratlas lining up for take-off at the other end of my runway I turn tail and flee! I had landed in the wrong direction. A small French fire-engine does a champion cross-country sprint towards me and a man clinging to the side beckons me to follow. We reach the C.G.T.M. hangar, where my French host meets me. He is still wearing his flying suit after making a dead-stick landing southwards in a Super Mystère on the runway I had just violated!

Wednesday evening. *Istres - Toulouse/Blagnac. Route: Montpellier, Mazamet. Distance, 160 n.m.* This was to be a relatively short hop back along the route I had followed from Bordeaux. The same rough winds with clear skies gradually clouding over at about 7,000ft west of the mountains. Radio was still totally *parasité*, as I climbed away over a sad graveyard of abandoned Espadon and Baroudeurs. Made straight for 6,500ft to clear the main turbulence and soon slide-ruled a ground-speed of 98 kt, which I held for the whole flight. For the first few minutes I kept a weather eye on a shark-like U.S. Navy Skywarrior which was making a rather wayward air test around me. Because I was flying straight into sun, I could see very little ahead.

Abandoned the southerly valley past Carcassonne and flew along the ridge south of the Mazamet valley. Remind me never to try that Mazamet valley in bad weather. It is narrow and deep and has a wicked 200ft-high barrier of hill right across it half-way along. Spot heights either side are about 3,000ft. The Carcassonne

"Flight's" Gemini at Marignane. The heading picture was taken at 8,000ft while flying south-east past the Camargue marshes to Marignane

"Flight" photograph



Met. forecast for Toulouse - Reims: cu-nims to 20,000ft, severe turbulence, heavy showers, hail and freezing level at 3,500ft. Otherwise wizard

ROUND FRANCE ON BUSINESS . . .

valley is a gateway from Mediterranean to Atlantic weather and is liable to turbulence and rough winds.

Pin-pointing difficult in the complicated country north of Béziers. Soon, eight-eighths cloud at 7,000ft hid the sun as I left the hills behind over Mazamet. Suddenly noticed, from bonfire smoke, a 90 deg shift in wind which considerably upset my track-keeping. Temporarily only approximately aware of position, but continued to Toulouse and its unmistakable river patterns.

Thursday evening. *Toulouse - Reims. Route: Toulouse, 10 n.m. E. of Limoges, 10 n.m. S.E. of Chateauroux, Montargis. Distance: 383 n.m.* Highly unstable weather with 25 kt winds from west and cu-nims up to 20,000ft giving violent rain- and hail-storms. Decided at first to leave as early as possible to give myself time for diversion, but was told that winds would drop later and arranged to take off late, leaving myself 20 min spare daylight at the other end. Limoges and Chateauroux homers said to be excellent. The first 160 n.m. would be over hills ranging up to 2,000ft. The forecast chart is reproduced above.

Having allowed myself a bare 20 min daylight at the other end, I was called back from the take-off point to complete some paper work. Despite agile taxying and running, my daylight allowance went west. Flew out past a biggish storm and headed north. Brilliant visibility under four-eighths cloud, but strong wind giving over 10 deg drift and rain storms dotted over whole area beneath towering cu-nims. Making less than 120 kt.

Storms more frequent and larger as hills rise under constant cloud-base. Several whoppers just off track. Pass Cahors and Gourdon at 800ft. Then find a 15-mile front of dense rain storm under a mighty cu-nim right across track just north of Brive la Gaillarde. A détour round this will lose me my daylight allowance and mean a diversion. Railway zig-zagging across my track disappears in dense rain. Turn left to follow another railway to Limoges, but this likewise vanishes. Turn farther left and try to plot course across rolling country. I think I see some horizon through the centre of the storm, which means it must be of short duration, so I turn into it on the original track but am immediately engulfed in heavy hail and rain: the radio goes wild with static and I turn away.

Flying 250ft above ground and everything suggests a 180 deg turn, but a last glance over my shoulder shows that horizon beckoning again. Fix my position absolutely, chose a heading: check compass: set altimeter arbitrarily 10 millibars lower: check fuel: circling for some minutes now and my Day-Glo paint must be attracting attention. I straighten up and fly into rain and hail; completely blind for a few seconds, with water bubbling up from under the windscreen. Can see only blurred bright green of the hills close below and then break out into brilliant visibility again with large hailstones pinging on the windscreen through clear air. There is no way of avoiding them so I keep well down in my seat and pull goggles down to shield my eyes, just in case. A few more minutes and all is calm and serene again. For two more hours I fly on in spectacularly good visibility, navigating by hill ranges and other features I can see from 20 miles away.

Chateauroux on my left, Bourges on my right; the country falls away into a flat plain. I cross the Loire with a ground-speed rising steadily beyond 116 kt. Later it reaches 136 kt and my daylight allowance looks better. But it is terribly cold, even at 2,000ft. A long tract of snow or hail on fields and roofs at one point. Judging my height by eye from a known spot-height, when I was still flying at a few hundred feet, I reset my altimeter and found I had to reduce no less than 20 additional millibars! The wind was doing queer things near those storms.

Crossing the two rivers at Montereau, east of Fontainebleau, I pass through a long line of rain with a line of anvil-headed cloud above it. The sun is setting, but only 80 more miles to go at 136 kt. All seems serene when I see another large storm right where Reims ought to be. Sure enough it forms a solid barrier on the hills south-west of Epernay, but I see another horizon through the middle and press on immediately. Nothing could be as unpleasant as that earlier storm. In the rain I lose track of landmarks and break out in the clear again over Epernay.

A few days before I was told that the tiny Max Holste airfield "lies either here or here" and two ink marks were made on my map south-east of the town. I soon recognize the little field, and notice the strong wind blowing a thick plume of factory smoke straight down the grass runway. A first pass to check the surface from 10ft. The sun is setting behind some storm clouds and rain is approaching fast. A tight circuit, but on finals a little Jodel two-seater cuts in front and disappears into the smoke along the runway. I don't blame him for getting in out of the rain. Another circuit, dodge into the smoke from the side and at 20ft strike turbulence and the windscreen is suddenly closed in by rain. No time to delay so I hold on power and lower the Gemini gently down, watching the little white markers passing close by on the left. Finally the wheels touch and I cut. I reach the open hangar, and turn tail-on to the doorway. Before I have switched off I am pushed in out of the rain.

Friday morning. *Reims - Toussus le Noble. Route: straight to a point half-way between Brétigny and Orly. Distance, 90 n.m.* A morning flight before the cu-nims had built up. Headwinds, occasional rain, routine flight.

Saturday morning. *Toussus - Bernay. Route: straight line. Distance, about 65 n.m.* Delayed 20 min to clean two oiled-up plugs. Routine flight. On finals, I notice a piece of brown paper on the runway. It turned out to be a lamb, which stood stock still as I passed within 10ft of it.

Saturday afternoon. *Bernay - Croydon. Route: Le Touquet (landing for fuel and Customs), Dungeness, Tonbridge. Total distance, 185 n.m.* Scheduled to fly to Dinard, but a front is coming in, with lowering cloud and thin rain. It seems useless to go through the front to Dinard and then return through it to England. I want to pass the South Downs before ceilings get too low. So we take on 13 gal of fuel and bowl up to Le Touquet at 136 kt with a strong following wind. Visibility not good but improving steadily. Le Touquet organization is amazing. A porter meets us with a baggage trolley as soon as we stop. We brief for refuelling, pass Customs, stamp the carnet, pay landing fees, get weather briefing, make flight plan, buy brandy and regain our refuelled Gemini and are off the ground again exactly 25 minutes after touching down. That is real service.

Cloud is lowering steadily over England and I fear that it will settle on the hills south of Croydon. There is still a 4,000ft ceiling over the Channel and we cross at 3,000ft in 17 min, hitting "Dungy" on the nose. Half-way across we notify Touquet and change to 126.7 Mc/s. London control comes up Strength 5, giving the actual weather states all over south-east England every 20 min. It is still passable, but deteriorating, and by Tonbridge we are forced down to a few hundred feet. We scrape over the escarpment south of Biggin Hill, but Croydon itself is still "fully V.F.R." Land; engines off, switches off; rush off home.

Stage	Dist. n.m.	Est. time hr min	Time on track hr min	Av. kt	Fuel gal	Av. gal/hr
London - Paris ...	180	1 30	1 30	120	22.1	14.7
Paris - Bordeaux ...	260	2 10	2 35	100	39.4	15.3
Bordeaux - Marignane	292	2 25	2 10	135	30.6	14.1
Marignane - Istres ...	15	—	0 20	—	—	13.0
Istres - Toulouse ...	160	1 20	1 40	96	26.0	
Toulouse - Reims ...	380	3 10	3 05	123	25.1	
Reims - Paris	90	0 45	1 00	90	—	
Paris - Bernay	65	0 32	0 40	98	13.1	14.4
Bernay - Le Touquet ...	102	0 51	0 45	136	41.6	
Le Touquet - Croydon	83	0 42	0 45	111	10.7	
Totals	1,627	13 25	14 30	112	208.6	14.3

Straight and Level

FRENCH sporting flying is an expanding business; so many club aircraft and airfields now have V.H.F. radio that they have a common frequency all to themselves—123.5 Mc/s. You can call on this channel and the nearest club will give you any flight information—or take your order for lunch, petrol, taxi or what-you-will. A colleague saw it working most effectively at Bernay recently.

There will be a boom in British club aircraft soon, too. All those who can afford them will rush to buy ultra-lights which use only a gallon or two of premium motor fuel an hour. If they can't afford to buy the new aircraft or pay the tax which will shortly be added to their petrol bill, they will have to go gliding or stop flying. Their common communications channel will be surface mail, threepence per envelope, including tax.

● *Fairey announcement:* "The Rotodyne is a large transport helicopter. . . ."
"Flight" editorial last week: "The swift, safe helicopter airliner is with us . . . as the incomparable Fairey Rotodyne."
Fairey advertisement last week: "The Rotodyne . . . is not a helicopter. . . ."

● Incidentally, the same editorial last week remarked how the helicopter had grown up—in terms of size and efficiency, that is. Which, of course, is happily true. But at the same time I am glad to observe that Gyro-Copters and Rotorcycles are bringing the ideal of the little aerial runabout nearer realization. This is a dream that people have cherished for over half a century; in proof of which I must tell you about a perfectly splendid American novel, *Virginia of the Air Lanes*, I have just been reading. Published in 1909—the year *Flight* was founded—it relates how Virginia sidesteps into a teeny-weeny helicopter and buzzes smartly off when an amorous tycoon makes a fast pass aboard a mammoth air yacht.

I've heard of girls taking their roller skates or water-wings along. . . .

● The Technical Editor has pointed out to me the magnitude of the achievement of all the major English-speaking countries in agreeing upon standard values for the yard (linear measure) and the pound (avoirdupois). It appears that there were previously a whole fist-full of both measures, each differing from its neighbours by so many parts in a million. Now we have the international standard yard (defined as 0.9144 metre) and the international pound (defined as 0.45359237 kilogramme).

All very fine. Unfortunately, the United Kingdom Board of Trade have pointed out that these new units have no statutory force in our tight little island "and may not be used for trade purposes." What a good thing airliners are not sold by weight.

Meanwhile, I am all in favour of injecting a little variety into our humdrum daily lives, and I am sure all my readers will be delighted to learn that the Boeing 707-436, as purchased by B.O.A.C., has a gross wing area of 10.622 square rods, total fuel tankage of 24,127,488 drachms and a volumetric freight capacity of 1,866.75 struck bushels (dry measure, of course). And phooey to anybody—especially editors—who understands the metric system.

● Capt. J. W. G. James, flight operations director of B.E.A., writing in the Corporation's pilots' magazine *Intercom*:—

"We learned enough [from the very-low-fares policy on certain domestic routes] to show us that the pattern of low fares=rising traffic is as valid for our type of short-haul operation as it has been . . . on the North Atlantic."

● Do you often worry about your health? Are you often unhappy? Do you sometimes feel like cursing? Do strangers keep trying to hurt you? These were some of the actual questions used recently by the Psychological Corp. of New York, on behalf of the National Aeronautics and Space Administration, to "evaluate the personality" of Project Mercury astronaut candidates.

You may think these are just stupid questions. Well, they're not, they're part of the Minnesota Multiphasic Personality Inventory. And how about the next test—complete the following sentences to express your real feelings:—
1. I am sorry that.....
2. I can never.....
3. I hope.....
4. At times.....

Personally, at times I can never hope not to worry about my health. I am sorry that I am often unhappy and sometimes feel like cursing the Minnesota Multiphasic Personality Inventory, but strangers keep trying to evaluate my personality.

Now let's throw *your* personality up and see where the pieces fall.

● Do we really have to be told every few weeks that Doppler navigation "works like a railway whistle and takes you anywhere in the world without ground aids"?

For everyone who needs to know, Doppler navigator principles became common knowledge at least two years ago; yet these coy little explanations still crop up first in manufacturers' publicity releases and then in the newspapers.

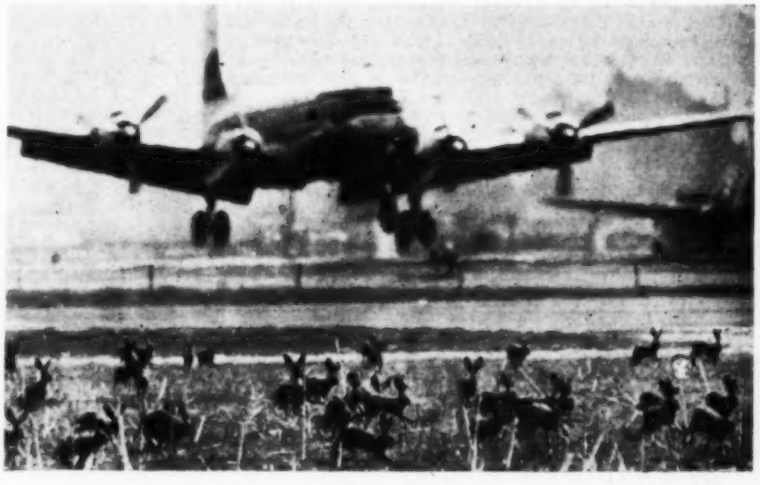
Let's call it a day and assume that the kindergarten stage may now be skipped.

● Hawker Siddeley Paris Show press release: "Large panels will display in easily digestible form chief features of the Avro 748. . . ."

The Group usually lays on something a little tastier than this. But I suppose things are getting tougher everywhere.

ROGER BACON

I quote the news agency caption to this lively picture: "Coming in to land at International Airport, Los Angeles, California, a passenger aircraft [a DC-6B of Western Airlines] scatters hundreds of rabbits. A tacit pact of peaceful co-existence has for long reigned between the rabbits and the airport authorities. The airport has, accordingly, become a sanctuary for hordes of rabbits. But trouble is brewing. The rabbits are killed in dozens by incoming planes. Their bodies attract buzzards—a dangerous threat to safety. This picture was made by Art Rogers of the *Los Angeles Times* with a Foton 35-millimeter camera fitted with a 24-inch lens."



Correspondence

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. Names and addresses of writers, not for publication in detail, must in all cases accompany letters.

Flight-deck Staffing

MAY I point out that the views expressed by I.F.A.L.P.A. on crew complement are most definitely not shared by the more than 40,000 flying staff who are members of the International Transport Workers' Federation (I.T.F.)? They comprise, incidentally, every category of flying staff, including pilots, and can therefore lay claim to greater and more varied experience of crew complement needs than is possible for a single professional group. The I.T.F. Civil Aviation Section is strongly of the opinion that the safety of the travelling public demands that the accumulated skill and experience of specialist flight crew members should not be recklessly dispensed with on the alleged grounds that technological developments have made them unnecessary. The truth of that assertion has not by any means been proved—least of all to the satisfaction of the flying staff themselves. Complete reliance on automatic aids without the possibility of their being monitored or replaced by human skills in case of emergency or mechanical failure can be dangerous and might have extremely serious consequences for both passengers and crew. Nor should the very real risk of overburdening crew members with multiple duties and thus producing fatigue and consequent impairment of judgment be overlooked.

On this issue, the pilots of I.F.A.L.P.A. have adopted a policy which is diametrically opposed to that of the I.T.F. Flying Staff Section, and one cannot avoid the impression that in doing so they have been more than a little influenced by the threat of pilot redundancy in the jet age. Nor is it without significance that the new I.F.A.L.P.A. line is more or less identical with that of its strongest and most influential member-organization, the U.S. Air Line Pilots' Association, which for some time past has been trying to take over the jobs of American flight engineers. There are, in fact, very good reasons for thinking that certain organizations within I.F.A.L.P.A. are very interested in having their domestic policies "sanctified" by the international body.

I am afraid that in the circumstances one cannot set very great store by I.F.A.L.P.A.'s reservations on the continued use of specialist crew-member experience. Words are often belied by deeds, and the hard fact of the situation is that the U.S. pilots are not the only I.F.A.L.P.A. member-organization which has threatened the jobs of other crew members. It is not so long ago, for example, that the trade union side of the National Joint Council for the Civil Air Transport Industry publicly rebuked the British Air Line Pilots' Association (whose secretary was then also secretary of I.F.A.L.P.A.) for negotiating agreements involving the take-over of navigating, flight engineering and radio duties without any attempt at consulting the other unions concerned.

London, S.W.4. O. BECU,
General Secretary, International Transport Workers' Federation.

Agricultural and Industrial

COMPREHENSIVE though it was, John W. R. Taylor's article "The Toy that Grew Up" [*Flight*, May 15] did give the impression that Fison-Airwork are only concerned with agricultural helicopters. This, of course, is not so; since 1953 Fisair helicopters have been flying extensively on oil exploration and other non-agricultural work in the Middle East, Pakistan, the Sahara, the Caribbean and West Africa.

We are particularly proud of our helicopter unit in West Africa, where our four Westland S.55s, shortly to be joined by a fifth, have been maintaining a passenger and freight service for a well-known oil company since replacing, in 1956, our two Hillers that commenced the service nearly six years ago. The S.55s, operating over swamp and primary forest, are maintaining strict schedules day in, day out, in an area notorious for its weather conditions. Since the Hillers commenced the service in 1954, the unit has flown 10,476 hours, carried 40,777 passengers and lifted 1,125 tons of freight. Additionally the helicopters are also used for survey, rescue and for aerial crane work.

In fact our helicopter operations are now divided into two categories—agricultural and industrial. Although I appreciate that Mr. Taylor probably knows this and that space precluded its mention, in deference to our transport helicopter pilots—most of whom have flown well over 2,000 hours with us but still cannot recognize an acre of potatoes from a height of six feet—I must put the record straight.

Bourn, Cambs. D. E. BOND,
Operations Manager, Fison-Airwork Ltd.

In Defence of the Wrights

YOUR charitable typesetter misread my handwriting [Correspondence, April 24]: it was "mischievous wickedness" I said my friend John Taylor suffers from, not "weakness"; and now more than ever:—

(a) The Wright machines were not dependent upon their weight-and-derrick catapult launching: it was a convenience. Not only could they take off without the device if they wanted, but wheels were being added to the skids of Wright machines by 1909. The wheeled Model B of 1910-11 was conventional enough.

(b) Rolls learnt on, and possessed, a British (Short)-built Wright; but he was killed on a French-built one, equipped with a rear monoplane elevator operating in concert with the forward biplane elevator.

(c) What petard am I hoist with? I happen to know that A. V. Roe had a copy of the article in *La Nature*, and never dreamt of quoting the Frenchman's figures, which were of course, referring to Roe's admitted automobile-towed flights: Roe never claimed more than 150-180ft powered take-offs. I pointed out that the machine was engineless, and said that take-offs down the pull-up slope were in his mind from the fact that he is seen at the top of it.

London, S.W.7. CHARLES H. GIBBS-SMITH.

THE letter from Mr. John W. R. Taylor [April 17] states that the Wrights' take-off on their first flight was mainly due to the strong headwind. Without doubt, it helped the machine to leave the ground, but it is also possible that the machine could have taken off without a strong wind.

The real reason for the Wrights' success was the complete control of the machine in flight, in which lateral control played an important part. Other aviators had no method for controlling their machines before the Wrights' patents were issued in 1906. The Wright machines were the first practical aeroplanes and did not kill one-quarter of the pilots who flew them. Can your correspondent prove that any other aeroplane could fly 24 miles in 1905? I do not think that any other power-driven machine was in existence.

In your issue of May 15 Mr. Taylor states that the Wright machine came to a "dead end" because of the catapult starting device. I must remind him that the Wright machine was fitted with wheels in 1910. Most of the flights of 1904-5 were made with just the starting rail only; it was in 1908-9 that they mostly used the catapult.

Incidentally, Cecil Grace was flying a Farman-type machine, not a Wright, when he disappeared over the Channel.

Southampton. L. HEATHER.

"Date with Venus"

IN *Flight* of May 1, in a paragraph under the above heading, you state that M. Dollfuss was attempting to look at the planet Venus, "now at its nearest point to the Earth."

At the time Venus was not even at maximum elongation east, which occurs on June 23, and certainly not at inferior conjunction, which is when it approaches most nearly to Earth.

At maximum elongation east or west Venus appears half-moon-shaped and is then roughly the same distance from Earth as the Sun, i.e., 93 million miles. At inferior conjunction Venus is between Earth and the Sun and is not visible at all unless it should transit the Sun, its distance from the Earth then being some 26 million miles. The next inferior conjunction is on July 26, but the next transit of Venus is not until June 2004.

I understand that the purpose of the ascent by M. Dollfuss was to measure spectroscopically the amount of water vapour in the atmosphere of Venus. To do this it was necessary for him to get as high as possible so that the water vapour in the Earth's atmosphere did not interfere with his measurements. Unfortunately, his attempt was not entirely successful.

Crawley, Sussex. J. CRITCHLEY GRAHAM.

FORTHCOMING EVENTS

May 24-31. Milan Aero Club: Rallie des Stars.
May 30-31. Dauphiné Aero Club: Grenoble Rally.
May 30-June 1. Air Sport Luxembourgeois: Rallie des Vins.
May 30-June 7. Aero Club de l'Ouest: Gliding Championships, Angers.
May 30-June 7. R.A.F.A.: Air Week, Brighton.
June 5. Helicopter Association: "Some Design Aspects of Tandem Rotor Helicopters," by J. D. Sibley and C. H. Jones.
June 5-7. Skegness International Invitation Air Rally, Ingoldmells.
June 6. Helicopter Association: Helicopter Garden Party, Dunsborough Park, Ripley, Surrey.
June 6-7. Florence Aero Club: Rally.
June 6-7. Le Zoute Aviation Club: Rally (date to be confirmed).
June 7. Royal Netherlands Aero Club: Free Balloon Contest, Etten-Leur.
June 12-21. Paris Aero Show.
June 13. R.N. Air Station Arbroath: At Home.
June 13-14. Flers Aero Club: Normandy Rally.
Sept. 7-13. S.B.A.C. Display and Exhibition, Farnborough.

Posed together for the first time at Wisley are B.E.A.'s turboprop relatives: a 63-seat Hi-D Viscount 701 and the up-to-139-seat Vanguard. The Corporation are currently concerned with the capacity that should be offered by the Viscount's jet successor—the D.H.121—in 1964 or 1965

AIR COMMERCE

Subsonic Setback?

IN a sudden flurry last week, a quartet of daily newspapers burst forth with articles in confirmation of the loudest and most recent buzzing in the usually well-informed aeronautical grapevine—that the D.H.121 and the VC.10 were variously "in trouble," or "being redrawn," or that their "economic operation was threatened," or that they would be "years late." Not surprisingly, the breakfast-table bombshell on the morning of May 20 caused considerable alarm, not least among those who depend for their livelihood on the success of either project.

Vickers-Armstrongs immediately issued the strongest denial, rebutting point by point allegations against the VC.10. It was not, they said, "in trouble," "delayed," "being redrawn," "under review," "underpowered" or "years late," nor was its "economic operation threatened" on any route. Progress was to schedule and the economics and technical performance were now better than ever because of engine development by Rolls-Royce. They added that "no attempt was made to check the veracity of these unfounded allegations, so damaging to British industry and enterprise, with the designers of the aircraft." Ominously, de Havilland said nothing, except to refer the matter to an equally non-committal B.E.A.

There is, of course, nothing unusual about making quite radical specification changes in the early design stages of a new aeroplane, and the D.H.121 in particular is intended to meet as exactly as possible B.E.A.'s forecast requirements for the mid-1960s. In July 1956 these were envisaged by the Corporation as a short-range jet with three engines, a gross weight of about 120,000 lb and accommodation for 80 tourist passengers or 100 in a high-density layout; and this was the specification to which the Rolls-Royce RB.141 engine was matched and on which more than 18 months of active project and detail design have been based.

That B.E.A. should now sing a different tune is hardly surprising; foreshortening delivery time has provided a clearer idea of what will best be suited to European operations in 1965-70, and it now seems that the original estimates of size and weight were some 20 per cent optimistic. What is really needed, B.E.A. now appear to argue, is an aeroplane with the same performance as the earlier 121, but weighing 100,000 lb or less and with a maximum of 80 seats. The design could then be stretched as extra capacity was required.

There are also doubts as to the wisdom of the original D.H./B.E.A./Rolls-Royce decision to adopt a triple-engined layout, partly because of the intractable installation and removal problems of the fuselage-mounted engine but also because the total thrust of three RB.141s would be excessive for the lighter airframe. The original 12,000 lb thrust from each engine has already been increased—in the characteristic fashion of Rolls-Royce development—to the embarrassment of Airco, who have been designing to a limited gross weight with no intention of stretching capacity and with little need to increase airfield performance. Nor can cruising speed be greatly increased without incurring economic penalties as the Mach drag-rise begins to be felt.

While B.E.A. are quite justified in keeping the design of the D.H.121 fluid until they are as certain as possible that their specification is commercially correct (the contract, for £30m for 24 aircraft, was to have been signed three months ago) they can do so only at the risk of delayed delivery. What is much more disturbing is that, while it may not matter greatly to B.E.A. if their short-range jet services start in 1964 or 1965, it is of extreme concern to Airco and to the British industry, whose hopes of export sales may very well depend upon demonstrations and service experience with the D.H.121.

It is not particularly comforting that much the same change of viewpoint that is evident within B.E.A. has afflicted Boeing with the 727 and Douglas with the DC-9. The latter in particular is said to have undergone—albeit at an earlier stage—a similar reduction in size. At one time the gross weight was to have been 125,000 lb, but Douglas now seem to favour about 94,000 lb, eventually increasing to 105,000 lb. Boeing's market analysis suggested a slightly smaller aeroplane, intended to carry rather fewer passengers over shorter stages; the take-off weight would probably be 75,000 lb increasing to 94,000 lb. Neither manufacturer has yet chosen a powerplant, but the most likely selection is said to be a 7,000 lb-thrust turbofan (four per airframe) that would be common to both aircraft. The DC-9 and Boeing 727 might then be adjusted in size to become more nearly the same weight.

The total thrust envisaged for the D.H.121's American counterparts is thus about 28,000-30,000 lb, and this order of power may well be that now required for the British short-range jet. There are possibilities that by 1964 two RB.141s would be adequate for Airco's needs and would still have the development potential to allow an eventual 20 or 30 per cent airframe stretch (see "The Twin-Jet Airliner," *Flight*, March 6). But it is hard to discredit the logic of the argument for three engines by any event of the past three years—with the sole exception, perhaps, of the easy acceptance of the Caravelle. There may be more resistance to two engines outside Europe and South America—as Boeing and Douglas seem to believe—but airline fashions tend eventually to receive universal acceptance. Whatever de Havilland now decide (and a change of engine to say, Bristol-Siddeley fan-Orpheus has been suggested) the project has almost certainly been put back by perhaps nine months, perhaps a year; or, in other terms, to be level with—or even a little behind—the DC-9 and Boeing 727 *at this stage*. This is the penalty of designing under what Mr. W. E. Nixon, de Havilland chairman, described in his recent annual report as "terms more onerous than anything D.H. had previously undertaken," which tie Airco so closely to the particular needs of B.E.A. In contrast, the American short-range jets are each a compromise between what several U.S. airlines say they want and what Boeing and Douglas—from experience and a comparison of viewpoints—think they will want. And both aircraft are still firmly expected to be available in 1962 or 1963, probably the earliest time at which they could be sold.

The pitfall into which the industry has again stumbled is that of having designed exclusively for one customer an aeroplane that has potentially a much wider scope. (To point to the Viscount as successful endorsement of this policy is to overlook two factors—the lack of direct competition at the time and the influence of T.C.A. in preparing the Viscount for the American market.)

But now there are signs that the new specification will soon be frozen. Then the onus will be on de Havilland, as prime contractor, to exercise single-minded drive in producing the D.H.121 in the minimum possible time.

A. T. P.

The most important single operation being conducted by any British independent airline is Hunting-Clan's trooping contract to Singapore. Here troops and their families settle down for the first flight. (Right) Aerolineas Argentinas officials disembark at London Airport from a Comet 4 prior to the inauguration of the first jet services across the South Atlantic on May 19 and May 20

AIR COMMERCE . . .

B.E.A. CARRIES MORE TOP PEOPLE

AT first sight a rather surprising trend of B.E.A.'s 1959 traffic is that sales of first-class seats are increasing over those sold in the corresponding periods of 1957 and 1958. This year about one in every 12 passengers was booked to travel first class; last year the proportion was one in 15 and the year before one in 17. This average figure for all the Corporation's routes is rather misleading because of the unequal division between the seats offered on international and domestic routes. In April one passenger mile in five was first class travel on internal services and one in 20 on overseas flights. But it would be wrong to interpret the greater number of first-class seats that B.E.A. are offering this year (all Viscount 806s have been modified by increasing the number of first-class seats from 12 to 16) as reflecting a tendency for more passengers to decide in favour of travelling first class. The much more probable explanation is that, had B.E.A. offered a higher proportion of first-class seats in previous years, they would have been able to sell them.

Commenting upon the trend for the airline to carry more passengers in first-class seats, Lord Douglas, B.E.A.'s chairman, said that this was "A further manifestation of our fares policy for the future, which is to lower the price of our product at one end of the scale and thus create and expand a mass travel market, while providing a better class of service at higher fares for those who . . . are prepared to pay for it.

"B.E.A.'s future rests primarily with the low fare market but we have no intention of throwing away our valuable first-class clientele because of our ambition to provide air transport for the masses."

Lord Douglas also had some encouraging news about Viscount fleet utilization, which has increased steadily during the six years that Viscounts have been in Corporation service; approved overhaul life of the Rolls-Royce Dart engines has also been raised. Dart 506s and 510s are now approved for a period of 2,300 hr and average utilization of Viscount 701s is up to nearly 2,500 hr per year. Both the Viscount 802s and 806s are achieving utilizations of over 2,000 hr and the approved life of the latter's Dart 520s is up to 1,500 hr, an increase of 1,000 hr in just over a year.

The airline is taking rapid strides to make up the ground it lost during last year's recession and all seems set for a good summer. Over 1,000m passenger miles were flown for the first time in the 12 months ending April 30 and results for the month showed an increase in the number of passengers carried, in comparison with April 1958, of 18 per cent, and an increase in freight ton miles flown of 33 per cent. Forward bookings are "most promising," particularly in response to lower fares for inclusive tours. The latest to be announced is a package holiday flight to Moscow for about £120 inclusive, under a scheme to be operated by B.E.A., British travel agents, Aeroflot and Intourist. Travel agents were carried on B.E.A.'s second service to Moscow.

HELICOPTER SERVICES FOR ISRAEL

THE first civil helicopter service in Israel was inaugurated at Sde-Dou Airport, north of Tel Aviv, on May 15. Arkia, the Israel domestic airline, is to operate two Alouettes on a charter basis and will charge about £50 an hour. The helicopters are the property of the Alisa company, which is a partnership between the Israel Defence Ministry and Mr. Y. Shidlovsky of Paris.

At the opening ceremony guests of Arkia were M. Guy Mollet, former French Prime Minister, who was visiting Israel as a government guest, M. Carmel, the Transport Minister, and the French Ambassador. Operations were inaugurated with a helicopter tour over Tel Aviv for the benefit of the airline's guests.

THE GALLANT FOUR HUNDRED

THERE have been many major landmarks in the history of the Vickers Viscount, and we have been glad to record the significance of each as the occasion warranted. Many came when the aeroplane was excitingly new; when roll-out and first flight were imminent, and then had taken place; when the first delivery was made; when the first scheduled service was flown and the first foreign orders were placed. Each was a milestone in the formation of a reputation that assures the Viscount of V.I.P. status in aeronautical history.

When the Viscount began to see service all around the world, it was the operators who provided evidence that here was something rather exceptional.

Viscount milestones nowadays are those of high achievement: 1¾ million hours flown; operations in 33 countries with 40 airlines, seven governments and four business houses; and 144 aircraft delivered to the U.S.A. and Canada for a return of £57.1m. Four hundred and seven Viscounts ordered, and today, May 29, 400 delivered. G-APTB, the 400th production aircraft and the first of Hunting-Clan's three V.833s, is being handed over to Mr. P. Ll. Hunting, chairman of the Hunting Group of companies, by Sir George Edwards, managing director of Vickers-Armstrongs, and there is to be a ceremony at Wisley to mark the occasion.

The aircraft will subsequently be used for tropical trials by Vickers-Armstrongs at Khartoum and Nairobi, before being put into service by Hunting-Clan. Viscount 833s are powered by Dart 530s, with take-off performance increased to 1,910 s.h.p. for Safari operations by reducing the amount by which the engine is normally de-rated over the take-off range of power. Styled by Charles Butler, the interior contains the greatest number of seats yet installed in a Viscount—up to 69, although the total will generally be 64. An arrangement has been made with Field Aircraft Services to install the seats and interior fittings and this company has been working in a contractural capacity at Wisley during the past week.

Footnote: As we go to press it is announced that two more Viscounts have been sold to bring the total (as corrected above) to 407. As foreshadowed in *Flight* for May 15, Misrair have placed an order for a fourth aircraft, a V.739A similar to the last two to be delivered to the airline. The other order is from the Royal Bank of Canada for a V.793, which has already been delivered.

Marshal P. Zhigarev, head of Aeroflot, in London last week on a goodwill visit, presented a statue of a bison to Mr. A. H. Milward, chief executive of B.E.A. Mr. Milward described it as "a symbol of the strength we need to compete with the Russian airline"

Operating base for Deutsche Lufthansa's Il-14s is Schönëfeld, Berlin

THE EAST GERMAN AIRLINES

ONE of the least-known airlines in the Western world is the East German flag carrier, Deutsche Lufthansa. Ever since its conception it has remained something of a mystery and information about it has previously been scrappy and disjointed. Fortunately the East German Deutsche Lufthansa has not operated into Western Europe, for if it did so confusion with the West German airline of the same name would inevitably arise. As a result of a ruling by the International Court of Justice at The Hague Interflug G.m.b.H. was formed to operate services from the German Democratic Republic to West Germany. The first route to be served will probably be one from Berlin to Copenhagen.

Deutsche Lufthansa was formed in May 1954 (although it did not receive any aircraft until late 1955) and its formation was endorsed by a statute passed on February 27, 1956 (Gesetzblatt Teil I, Nr. 23). By a further statute (Gesetzblatt Teil I, Nr. 71) of December 6, 1957, Deutsche Lufthansa was given control of Berlin-Schönëfeld airport, which then became the company's operating base.

The U.S.S.R. delivered the first aircraft to the airline—Ilyushin 14s—in 1955, under an agreement between Aeroflot and DLH. The aircraft had two alternative layouts, an 18-seat version and a 26-seat version. Both were initially used only on international services, and the Russian-built Antonov-2 was employed on internal services within the German Democratic Republic. On December 16, 1955, after German crews had been trained, a Deutsche Lufthansa Il-14 made the first official flight, carrying to Moscow a government delegation led by the East German Premier, Herr Grotewohl. Subsequently, in the last month of 1955 and the first month of 1956, government delegations were flown to China, North Korea, and the People's Republic of Mongolia.

Scheduled services soon followed; and on February 4, 1956, the first international scheduled flight from the German Democratic Republic (DDR) was operated between Berlin and Warsaw. (Il-14s have always been used on this route but they will eventually be replaced by the BB.152 jet.) This was followed by a Berlin - Prague - Budapest - Sofia service (May 16) and a Berlin - Bucharest service (May 19), operated by Il-14s, in pool with CSA; LOT; Malev; TABSO and TAROM. This phase of expansion culminated with the inauguration of the Berlin - Vilnyus - Moscow service on October 7, 1956. It is operated in conjunction with Aeroflot on a daily basis.

East German internal services began on June 16, 1957, linking Berlin with Barth (on the Baltic coast), Dresden, Erfurt and Leipzig. In the second half of the year this was developed into a circular service so that these cities were interlinked, and in the first year (1957) 25,000 people were carried. This figure had risen to 52,000 in 1958 and the 1959 total is expected to be much higher. To develop internal air traffic Deutsche Lufthansa introduced Super Aero 45 on air taxi services between German cities and some of East Germany's nearer neighbours. These aircraft have proved very popular.

Besides operating passenger services, DLH undertakes specialized agricultural work, such as crop spraying, with L-60 Brigadyrs and Antonov-2s. In 1958 these aircraft flew a total of 70,000 km. Another activity is charter flying; in recent years DLH aircraft have visited Norway, Denmark, Finland, Albania, Austria, China, and Vietnam. Special tourist flights, on which 18,000 travellers were carried, were also made for the State travel agency.

Air freight is another important aspect of Deutsche Lufthansa's routine, and to cope with the increasing volume of freight a new freight office was opened on the Gontardstrasse, Berlin, in September 1957. Freight is carried on all aircraft, but a special cargo service is operated between Berlin and Moscow with all-freight Ilyushin 14s.

Il-14s provide the mainstay of DLH's fleet and at present they operate all scheduled services. The remainder are An-2s, L-60 Brigadyrs, Super Aero 45s; before long they should be joined by the four-jet Type 152. Designed by Prof. Dipl.-Ing. Baade, the Type 152 is being built in Dresden and the first production aircraft for DLH (registered DM-SCA) should shortly be delivered. Initially, these will operate the Moscow service.

The second East German airline, Interflug G.m.b.H., was formed on September 18, 1958, to specialize in international travel. It is run jointly by Deutsche Lufthansa and the German State Travel Agency (Deutsche Reisebüros). During the Leipzig Fair this year, between February 27 and March 11, Interflug operated a service between Copenhagen and Leipzig, using Il-14s chartered from DLH. No further details regarding the airline's future operations have yet been released, except that the Type 152 will initially be operated.

D. A. E.

SELLING OFF THE SURPLUS

THE best way to diminish the size of a problem is to tackle it. A few months ago, fears that surplus piston-engined transports —civil and military—would present an almost insuperable disposal problem loomed large on the U.S. airline horizon. A U.S. Government survey made last summer indicated that by 1961 the estimated number of transports which it was planned to sell-off was 1,693—843 by U.S. carriers, 600 by foreign airlines and most of the remainder—248 twin-engined transports and two four-engined —by U.S. military Services. The U.S. airline total is broken down into 556 four-engined aircraft and 287 twin-engined types, equipment that in first cost and for components and subsequent modifications $827m was paid out in 1957.

By its definition, the problem has been brought into perspective, and American industry and Government are co-operating in seeking solutions. Three bodies are engaged in a study of the problem; the Air Co-ordinating Committee, which has a pivotal relationship to Federal agencies and private industry, the export committee of the Aircraft Industries' Association and the Business and Defense Services Administration, Department of Commerce, to which a special assistant to the administrator has been appointed. No overall statement of U.S. policy on the disposal of used transports has yet been forthcoming, but investigations are proceeding along two general lines: the tapping of existing markets and the creation of new ones.

Undoubtedly the brightest light on this particular air transport horizon is the possibility of cashing-in on an expansion of air freight business that is an expected corollary to the introduction of turboprop freighters such as the CL-44, the Argosy or civil C-130. Once freight rates are reduced to an order of 8-12 cents per ton-mile and business is plentiful, there should be a demand for piston-engined freighters by new and established carriers. PanAm, for example, have recently announced their intention of expanding their business to include all freight services.

The other line of attack is to sell aircraft by offering them at particularly attractive terms financially. Some carriers have already disposed of aircraft by adopting the device of exchanging them for equity shares in another airline, although this is frowned upon as short-circuiting the normal market for outright sale or lease of used aircraft. The Ex-Im bank is apparently willing to finance purchases of used aircraft although its loans are of limited attraction because return payments must be made in dollars. The boldest idea so far put forward is that U.S. Technical Co-operation and Special Assistance programmes for development in underdeveloped foreign countries (formulated under the Marshall Aid plan) should by-pass improvements in roads, ports and railways in favour of the development of air transport using secondhand U.S. piston-engined fleets.

Of immediate concern is the large proportion of military aircraft that, by 1961, will swell the total of surplus airline equipment, and which could sharply depress secondhand prices. One rather hopeful suggestion is that an undertaking should be obtained from purchasers of ex-military aircraft that these should only be used for military purpose—a contention that Dakota operators are not likely to cherish.

AIR COMMERCE...

Hunting-Clan's first Viscount 833 is the four-hundredth to be delivered (see news item on p. 754)

EUROPEAN FOURSOME

IN Paris on May 21, the idea of a European pool for the operation of international services came a step nearer realization. Sabena, Alitalia, Lufthansa and Air France settled the fundamental issue of the share each airline is to contribute to Europair and how traffic will be divided between the four. The first impact of this great consortium—there will be a total of 35,000 employees and 250 aircraft—will be felt on the Atlantic routes, but servicing and refuelling facilities are to be pooled throughout the world. A provisional secretariat is to be established in Paris and the new organization will be operated by a series of permanent committees, the members of which have now been nominated. Further meetings are to be held in Paris before putting the pool into effect.

Europair is probably still too young a child to start squalling for traffic rights, but rationalization of North Atlantic services—with each airline sharing peak traffic periods—should result in quite substantial economies in an intensely competitive field.

CANADAIR 540 IN SOUTH AMERICA

ON May 15, during the demonstration tour of South America which the Napier Eland-powered Canadair 540 is making in search of markets among the Latin American countries, the president of Brazil, Senhor J. Kubitchek, accompanied by the ambassadors of Canada, Portugal, Mexico, Peru and Columbia, made a 600-mile flight from Rio de Janeiro to Brazilia, the site of the new Brazilian capital. This has been interpreted as evidence of the president's interest in the scheme to produce 540s in Brazil. A requirement for as many as a hundred aircraft—military and civil—has been mentioned, but various difficulties have so far stood in the way of the project reaching realization. In particular the country is suffering from inflation, which has sharply raised the cost of air travel. By agreement, fares were recently reduced by up to 20 per cent (see *Flight*, May 15) but the prospects of Brazil purchasing new aircraft seem at the moment to be rather remote and the idea of constructing aircraft there may be foundering on the same rock. Some of the many surplus aircraft which are said to be available in Brazil have been offered in Uruguay and Chile at very low prices but so far no buyers have been found.

The Eland-powered Canadair 540 has also recently been demonstrated at Eziza in Argentina. Although ten F-27 Friendships are claimed as a firm order against Aerolineas, in practice it seems that confirmation is less certain. Fairchild representatives in the Argentine recently called a Press conference to point out that Fairchild had managed to obtain a large credit in the U.S.A. to finance ten F.27s on deferred terms, and if Aerolineas did not want to take advantage of it, the sponsors of the credit would in time withdraw the offer. The country is going through a very severe financial crisis and the idea of buying new transport aircraft is not likely to be very well received by its Average Man, creating a situation that might be exploited by Canadair.

AIR TRAVEL MARKS TIME

AIRLINES last year failed to close the lead that shipping companies have established among passengers travelling to and from Britain. The latest figures published by the Board of Trade show that although the airlines showed up well on most of the long-haul routes, on the cross-channel routes to the Continent the shipping companies increased their traffic by 10 per cent while the number of air passengers rose by only 7 per cent. The air share of total traffic has increased steadily in the post-war period but last year remained unchanged at 41 per cent.

Cross-channel sea traffic increased particularly sharply on the routes to Belgium, thanks to the Brussels exhibition. Sea traffic to Scandinavia, by contrast, fell slightly. Air traffic to Belgium also rose remarkably sharply but on the other important European routes to France, Germany, Holland and Switzerland air traffic as a whole was down. The longer Mediterranean routes to Italy, Spain and Portugal showed improvement.

Traffic on the Commonwealth routes suffered both from the recession and from the reduction in the volume of emigration from the U.K. Air and surface carriers both experienced a fall in traffic on these routes, this fall being particularly marked in the case of Canada. But whereas the shipping companies also lost traffic on their non-Commonwealth long-haul routes, this field proved a profitable one for the airlines. Economy-class fares boosted their U.S. traffic, and the number of passengers flying on routes to the Middle East and to Latin America also showed a welcome rise.

I.C.A.O. PRIZEWINNER

TWO features distinguish I.C.A.O.'s annual report for 1958*: first, the up-to-date nature of the information; secondly, the impression of being closely in touch with the airline business.

Many past publications of the Organization have lacked these important attributes. In the field of statistics, particularly, I.C.A.O. has often tended to over-emphasize accuracy at the expense of urgency.

The report opens with a masterly review of the airline industry in 1958. The advent of the jets and the slowing down in traffic growth are singled out as the main developments of the year. Included in this section are estimated data showing the latest position on the traffic, financial and safety fronts. Detailed reference is also made to space travel: a field from which I.C.A.O. has obviously no intention of being excluded.

The activities of the Organization are then described in detail: air navigation, air transport, joint financing, technical assistance, air law and international relations are the six main fields involved. The report closes with a section on the organization, administration and finance of I.C.A.O. itself. A particular problem here is the inadequacy of the present headquarters premises in Montreal.

For a cost of a little over $3 million a year, I.C.A.O. certainly gives the air transport industry good value for money. The U.S. alone foots about one-third of the bill. Britain's share—slightly less than one-tenth of the total—is only £125,000.

The table below, abstracted from the report, shows the development of air transport since 1945. The People's Republic of China and the U.S.S.R. are excluded.

Year	Miles Flown (millions)	Passenger Miles (millions)	Passenger Ton-miles (millions)	Cargo Ton-miles (millions)	Mail Ton-miles (millions)
1945	375	5,000	490	75	90
1946	585	10,000	985	80	70
1947	710	12,000	1,170	185	90
1948	790	13,000	1,295	290	115
1949	840	15,000	1,480	390	130
1950	895	17,500	1,725	530	135
1951	1,010	22,000	2,120	640	165
1952	1,100	25,000	2,445	685	180
1953	1,195	29,000	2,835	720	190
1954	1,290	33,000	3,200	775	225
1955	1,430	38,500	3,725	910	260
1956	1,580	44,000	4,295	1,040	280
1957	1,750	51,000	4,880	1,135	300
1958	1,845	53,500	5,125	1,145	320

OPENING UP THE NORTH COUNTRY

ENCOURAGING signs of better air transport facilities for the North are to be found in the new services being offered this year for Manchester, Blackpool, Leeds and Bradford travellers.

B.K.S. Air Transport inaugurated their Yeadon - Basle service on Whit-Monday. It leaves Yeadon at 21.30 hr and returns there at 08.30 hr the following morning. Since this is a night tourist flight, B.K.S. are able to offer a return fare of £27 10s.

The airline are still hopeful that they will be able to start their proposed Leeds/Bradford - Dublin service before the end of this season. At the moment, they have obtained approval from the M.T.C.A. to operate it, but so far the Irish Department of Industry and Commerce have neither approved nor rejected the

**International Civil Aviation Organization: "Annual Report of the Council to the Assembly for 1958." Available from Her Majesty's Stationery Office, price 5s 2d.*

On the way home from its 18,500-mile tour the Handley Page Dart Herald stopped at Isfahan in central Iran. It arrived at Blackbushe, on schedule, on May 20, having visited 13 countries

proposal. Under the terms of the Anglo-Irish Air Agreement of 1956, both the State Corporations and British independent airlines were authorized to operate services into the Irish Republic in return for concessions to Aer Lingus-Irish Air Lines granting them fifth-freedom rights at British airports, notably at Manchester. In addition to B.E.A. participation on three Aer Lingus Dublin - U.K. routes, B.O.A.C. operate three North Atlantic flights weekly through Shannon, using Britannias, and B.K.S. and Silver City operate services into Dublin from Newcastle and Blackpool respectively. Now that the Valley/Mona operation has been decided in favour of Aer Lingus, Kildare Street may possibly turn a more sympathetic ear towards the B.K.S. Yeadon/Dublin application.

There has been considerable comment in Irish aviation circles on the question raised by Mr. N. Pannell (Kirkdale) regarding the numbers of passengers originating in the United Kingdom who travel by Aer Lingus services to the Continent.

Aer Lingus has only one U.K. pick-up point for its services to the Continent. This is Manchester, from where the Irish airline operates eight return flights weekly to the Continent. In pool with British European Airways and K.L.M. they operate three return flights weekly to Amsterdam and, in pool with Sabena, two flights per week to Brussels (and onward to Frankfurt). In pool with B.E.A. they operate the Manchester - Düsseldorf sector of the Dublin - Copenhagen route, and the Manchester - Zürich sector of the Dublin - Zürich route.

On the other hand, B.E.A. operate up to two daily return London - Dublin flights, up to five weekly return flights Birmingham - Dublin, and, in pool with Aer Lingus and K.L.M., three return flights between Manchester and Dublin. In addition, B.K.S. Air Transport operate three return services weekly between Newcastle and Dublin, and, in pool with Aer Lingus, Silver City Airways operate twice weekly between Blackpool and Dublin.

BREVITIES

B.O.A.C.'s first Boeing 707 was airborne for the first time from Renton municipal airport on May 22.

* * *

A runway suitable for jet aircraft use is to be constructed at La Aurora airport, Guatemala.

* * *

Average load-factor on T.W.A.'s Boeing 707s since they entered service on March 20 has been 95.9 per cent. All jet services remain heavily booked.

* * *

Eagle's application for V.L.F. services to Hong Kong with DC-6s has received approval in Hong Kong, conditional upon review of the licence one and two years after the date of the issue.

* * *

On May 13 a DC-3 of Aerolineas Argentinas, *en route* from Buenos Aires to Bahia Blanca, crashed into the sea after taking-off from Mar del Plata. There were no survivors among the four crew and six passengers.

* * *

A DC-6 of Transportes Aereos Peruanas S.A., missing on a flight from Lima to Pucallpa on May 13, was spotted burnt-out in the jungle of north-east Peru two days later. There was little hope that any of the 12 persons on board was still alive.

* * *

On May 1959 a Tu-114 flew 4,225 miles between Moscow and Khabarovsk on the Manchurian border at an average speed of 485 m.p.h. This is claimed as a world record, although the distance was comfortably exceeded by a Britannia of El Al which flew 6,100 miles non-stop between New York and Tel Aviv on December 19, 1957. Moscow - Khabarovsk is to be a regular Aeroflot service.

A telephone call from the Belgian Congo set into action this charter of Goodyear giant tyres. They were flown from Elmdon to Amsterdam by a Don Everall DC-3 and completed their journey by sea

Decca 424 airfield control radar is to be installed at Madras Airport.

* * *

Mr. Joseph H. FitzGerald has been appointed executive vice-president and general manager of Ozark.

* * *

Icelandair carried 79,450 passengers in 1958—24,381 on international routes—at a load factor of 59.5 per cent.

* * *

A new training centre for United Airlines' flying staff is being constructed at Denver, Colorado.

* * *

Kabul airport is to be constructed by Russian technicians under a contract with the Afghanistan Ministry of Public Works.

* * *

AiResearch gas turbine power units (to be installed in Volkswagen vehicles) have been ordered by K.L.M. for starting their DC-8s.

* * *

The revised take-off weight, altitude and temperature limitations, expected for some time, are to be introduced on March 31 next year.

* * *

During the interval between the expiry of Irish Airlines' contract with Seaboard and Western and delivery of their three Boeing 707s in 1960, the airline may charter two Britannias for their transatlantic services.

* * *

Ceylon is negotiating new traffic rights with Italy and with Scandinavia. Air Ceylon's rights through Rome are at present subject to review every six months and it is hoped to reach a permanent agreement.

* * *

The C.A.B. have overruled U.S. domestic carriers' objections to direct flights from New York, Boston, Philadelphia, Washington, Chicago and Detroit to Tokyo, Manila and other points in the Far East. PanAm will now press its case for these services.

* * *

To suggestions that T.E.A.L.'s monopoly on the trans-Tasman route should be brought to an end, Mr. Mathison, New Zealand's Minister of Civil Aviation, has stated that "this would sound the death knell of T.E.A.L."

* * *

B.O.A.C.'s interest in the National College of Air Training is under the care of Capt. T. H. Farnsworth (chief of flight operations), Capt. W. B. Houston (training manager) and Mr. R. M. Forrest (solicitor). The two Corporations paid £340,000 for the A.S.T. airfield and buildings.

* * *

The Jean Lennox Bird Trophy has been awarded by the British Women Pilots' Association to Mrs. Jackie Moggridge "in consideration of the fact that she was engaged as an airline pilot carrying passengers in the employment of a commercial company. This was an achievement showing great skill, ability and personality." (Mrs. Moggridge began flying executive aircraft for Lec Refrigeration Ltd. in September 1957.)

SERVICE AVIATION

Royal Air Forces and Naval Flying News

R.F.C. guests at Netheravon on the occasion referred to below. From left to right:— A. Cdre. H. Le M. Brock; G/C. G. I. Carmichael; Maj. K. P. Atkinson; Brig. L. P. Evans, V.C.; Air Marshal Sir Patrick Playfair; S/L. S. C. W. Smith; Lt-Col. L. A. Strange; Maj. H. R. P. Reynolds; A. V-M. A. E. Borton; Marshal of the R.A.F. Sir John Salmond; Capt. J. Latta; G/C. R. Jones (station commander); A. Cdre. R. H. Varney; W/C. N. F. Dimmock; Air Chief Marshal Sir Philip Joubert; W/C. D. L. Allen; Lt. R. Torrance; Gen. Sir Henry Jackson; and A. Cdre. A. G. Board. Not in the picture, W/C. C. Darley-Pyne

Birthday Greeting

THE Queen is to take the salute on the balcony of Buckingham Palace during a fly-past by R.A.F. aircraft after the ceremony of Trooping the Colour on Saturday, June 13, her official birthday.

Celebrating Aerobatically

AN aerobatic team has been formed by the R.C.A.F. to take part in activities marking its thirty-fifth anniversary and the golden jubilee of flight in Canada. Known as the Golden Hawks and flying gold, red and white Sabres, the team is carrying out a four-month tour of the country from this month until August. Flying as a four-aircraft formation and giving a 25-minute display, it is led by S/L. Fern Villeneuve. There are eight pilots all told, two of them giving solo demonstrations while the other two are available to fill any position as required.

Forty-five Years On

NINETEEN former members of Nos. 3, 4 and 5 Sqns. of the Royal Flying Corps attended a guest night recently at Netheravon, where they previously served and were members of what is now the oldest officers' mess in the R.A.F. The station commander, G/C. R. Jones, said it was an honour to welcome the R.F.C. as guests; and in his reply Marshal of the R.A.F. Sir John Salmond said it was a grand thing that men who had not seen each other for forty-five years should be given an opportunity of meeting again. The reunion was organized by G/C. G. I. Carmichael and one of the guests, Lt-Col. Louis Strange, flew an Auster from Eastleigh to Netheravon—forty-six years after his first flight over the station.

Above, the Queen Mother presenting a standard to No. 617 Sqn. at Scampton on May 14

Left, a Sunderland of No. 205 Sqn., flown by the C.O., W/C. R. A. N. McCready, over Singapore Harbour on a farewell flight before the Sunderlands' retirement from R.A.F. service

F.A.A. "At Homes"

SIX R.N. Air Stations, three of them in Scotland, are holding "at homes" this year. The Scottish ones are Arbroath, Angus (June 13); Abbotsinch, Paisley (June 20); and Lossiemouth, Morayshire (July 18). The other stations open will be Brawdy, near Haverfordwest (July 18); and Yeovilton, near Yeovil, and Culdrose, Helston, Cornwall (July 25).

Llanbedr History

A HISTORY of the airfield which is now R.A.E. Llanbedr is being prepared; and Mr. A. Pearcy, a radio officer with air traffic control at the station (R.A.E. Llanbedr, Merioneth, North Wales) writes to say that any information or assistance readers could give towards its preparation would be much appreciated. Mr. Pearcy states that the airfield was constructed early in the Second World War and was opened by No. 232 (F) Sqn. with Spitfire 5s, plus a detachment of F.A.A. Swordfish, in either May or June 1941. He adds that he understands that No. 41 (F) Sqn. was one of the many units based at R.A.F. Llanbedr.

Five-year Pilots

DETAILS of the special five-year commission scheme for young men wishing to serve as R.N. helicopter pilots were announced by the Admiralty recently. Volunteers (aged between 17 and 23) must have G.C.E. educational qualifications and undergo a flying aptitude test, interview and medical examination.

After preliminary general Naval training at H.M.S. *Thunderer*, Plymouth, successful candidates will carry out basic flying training at R.A.F. Linton-on-Ouse. This is followed by a 14 weeks' helicopter conversion course and a three-week A.S. course at R.N. shore establishments. Finally, the pilots do 14 weeks' operational flying training at the Naval helicopter station at Portland.

Entry will be in the rank of cadet with normal promotion to midshipman, sub-lieutenant and lieutenant; pay, including flying pay, will be as for officers of similar rank employed on flying duties; and a post-service gratuity of £675 is payable.

Top three pilots in League 1 of the national gliding championships: from the left, the new champion, Geoffrey Stephenson (Skylark 3); Cdr. Nicholas Goodhart (Skylark 3), runner-up; and David Ince (Olympia 419x), who came third

GLIDING IN EARNEST

Final Days at the Lasham Championships

"FLIGHT" PHOTOGRAPHS

"CONGRATULATIONS TO GREYBEARD STEVE FROM GREYBEARD WILLS," was the telegram message read out at the prize-giving ceremony on the final day of the 1959 National Gliding Championships at Lasham. Addressed to the new British champion, Geoffrey Stephenson, it came from Philip Wills, who earlier that week had left Lasham to attend the Netherlands National Championships at Terlet Soaring Centre, near Arnhem.

The experiment of holding the championships in May instead of late July had proved a great success. Only on the last two days of the nine-day meeting did the weather break and fail to provide reasonable soaring conditions. The flying up to Thursday, May 14, was covered in our previous two reports.

The tasks on **Friday, May 15,** were an out-and-return race to Thruxton for League 2, and distance along a line through Trevose Head, Cornwall, for League 1. In the dry-thermal conditions that had become all too familiar during the week's flying, the best League 1 performances were set up by Bill Tonkyn (Skylark 3b) and Derek Piggott (Olympia 403), who straddled the set line at identical distances of 158 miles. They had landed on the edge of Bodmin Moor, past Launceston, while their nearest rivals were strung out between Exeter and Okehampton.

In League 2 a total of 21 pilots completed the Thruxton race. The clear 100 pt lead held by the Skylark 3b team entry of Mrs. Rika Harwood, Brian Masters and Hugh Mettam was increased further by Mettam coming in second on this day with a speed of 26.4 m.p.h. The day's best time was 1 hr 43 min (29 m.p.h.) by Kenneth Aldridge (T.42 Eagle), and third was Derek Goddard in the Crown Agents' T.45 Swallow at a speed of 25.2 m.p.h.

On total points Geoffrey Stephenson was retaining his League 1 lead, with Nicholas Goodhart in second place and slightly reducing the points margin. The totals were: *League 1:* 1, Stephenson, 400 pts; 2, N. Goodhart, 380; 3, Ince, 376; 4, Irving/Tonkyn, 356; 5, Burns/Martlew, 331. *League 2:* 1, Harwood/Masters/Mettam, 423 pts; 2, Sutcliffe/Jones, 290; 3, Phillips/Neumann/Whitfield, 289; 4, Stafford Allen, 282; 5, Baynes/Blake/Jefferson, 279.

Pilots had become so accustomed to working hard for their thermals in a hazy blue sky that the sight of fair-weather cumulus in the sky over Lasham on **Saturday, May 16,** came as a distinct and pleasant novelty. For League 1 an 84-mile out-and-return race to Oldbury Castle, near Calne, Wiltshire, was set; while League 2 were pleased to hear that for them it would be free distance. Most decided to head for Cornwall, and several declared Perranporth, 191 miles away, as their goal.

During the afternoon it became obvious, however, that many League 2 pilots were being forced to land in the Tiverton area. Soon afterwards the experts of League 1 began to arrive back at Lasham: first over the line at 4.50 p.m. was Sgt. Gough in the R.A.F. Olympia 419x, followed at roughly ten-minute intervals by Stephenson; Burton; Deane-Drummond and Nicholas Goodhart together; and Tony Goodhart. In all 18 succeeded in getting back from Oldbury, including one or two such as John Williamson (Olympia 401) who only just made it. John Hands in the London club's Sky came down just short of the fence.

Deane-Drummond and Gough, it transpired, shared the day's top honours by completing the course in 3 hr 6 min—a speed of 27.2 m.p.h. Equal third were Nicholas Goodhart and Derek Piggott, who took 3 hr 15 min, and the League 1 leader Stephenson was fifth (3 hr 24 min). Longest distances in League 2 had been 156 miles to Widemouth, on Bude Bay, by Cpl. K. Newholme (Olympia) and 139 miles to Bideford by Ian Paul (Skylark 2). The leading positions were now: *League 1:* 1, Stephenson, 490 pts; 2, N. Goodhart, 475; 3, Ince, 452; 4, Irving/Tonkyn, 438; 5, Burns/Martlew, 411. *League 2:* 1, Harwood/Masters/Mettam, 488; 2, Sutcliffe/Jones, 362; 3, Stafford Allen, 346; 4, Phillips/Neumann/Whitfield, 343; 5, Baynes/Blake/Jefferson, 342.

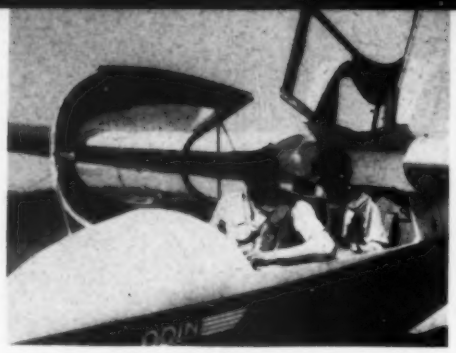
Strong winds and low cloud on Sunday and Monday of the Whitsun week-end forced the organizers to conclude the meeting by declaring two non-contest days. Before the decisions to do this had been taken, tasks were in fact set—free distance for League 1 and a race to Upavon for League 2 on Sunday, and an 85-mile goal race to Merryfield for both Leagues on Monday.

In accordance with the contest regulations, League 2 contestants —but not League 1—disregarded their worst day's points (which in most cases meant subtracting a zero) in arriving at the final championship results, which are given on the next page. Geoffrey Stephenson, who recently announced his decision to retire from world contest gliding, was a popular champion who had flown consistently well during the competitions. For the Stephensons the contest was indeed a family affair; in addition to the crewing of the champion's wife Beryl, there was also the tug-flying of their 18-year-old son, Carr. In the inter-Services championship the leading individual places were taken by (1) Cdr. N. Goodhart, R.N., (2) Sgt. A. Gough, R.A.F., (3) Sgt. John Williamson, R.A.F., and (4) Lt-Col. A. J. Deane-Drummond. Team results showed the R.A.F. first, the Navy second and the Army third.

At the prize-giving on the final day Dr. A. E. Slater, editor of the B.G.A. magazine *Sailplane and Gliding*, presented the Londonderry Cup to Geoffrey Stephenson, the L. du Garde Peach Trophy to Frank Irving and Bill Tonkyn, the Firth Vickers Trophy to Mrs. Rika Harwood, Brian Masters and Hugh Mettam, and the Furlong Trophy to Ray Stafford Allen, as individual and team leaders in the two leagues. Among other awards were the Kemsley Cup to Bristol Gliding Club; The Pan American Trophy to 2nd T.A.F. Gliding and Soaring Association; the Eon Cup to J. M. Butt and partners (entrants of the Olympia flown by Stafford Allen) and the Slingsby Trophy to D. M. Kaye and partners.

From the opening day, when the international glider trade fair had got off to a good start with the sale of three gliders by the Slingsby company, this year's national gliding championships had been more a light-aviation occasion than a purely gliding event. Several Rollason Turbulents, Peter Masefield's Chipmunk and other light aircraft had been regular visitors to Lasham during the

Winners in League 2 by a substantial margin were the Surrey Gliding Club trio (left) of Mrs. Rika Harwood, Brian Masters and Hugh Mettam, flying a Skylark 3b. In second place were J. D. Jones (in cockpit) and A. O. Sutcliffe of Bristol in a Skylark 2



Among the League 1 pilots were (above, left to right) Sgt. John Williamson (Olympia 401) who came ninth; Mick Kaye (Eagle), twelfth; and George Burton (Skylark 3b) who finished sixth. Left, included in League 2 were F/L. G. A. Coatesworth from 2nd T.A.F. (Meise), and Ian Paul (Skylark 2)

GLIDING IN EARNEST . . .

contest period, and Air Commodore G. J. C. Paul doubled as team manager of the R.A.F. contingent and host at the Air League caravan—when he was not flying his bright new Turbulent.

After this extremely successful contest, the British Gliding Association's next problem will be the selection of the pilots to represent Britain at next year's world gliding championships in Germany. If Geoffrey Stephenson changes his mind and becomes available, the first three pilots in League I at Lasham—Stephenson, Goodhart and Ince—have obviously strong claims. Just behind these three are several skilled young pilots with impressive records of high performances, and there is also Anthony Deane-Drummond, the previous national champion who dropped to tenth place this year. The B.G.A. seeding committee is expected to announce a final short list within a month or two. Their task is considerably harder than any set at Lasham.

KENNETH OWEN

1959 NATIONAL GLIDING CHAMPIONSHIPS RESULTS

League 1: 1, Stephenson (Skylark 3), 490 pts; 2, N. Goodhart (Skylark 3), 475; 3, Ince (Olympia 419x), 452; 4, Irving/Tonkyn (Skylark 3b), 438; 5, Burns/Martlew (Skylark 3b), 411; 6, Burton (Skylark 3b), 404; 7, Piggott (Olympia 403), 387; 8, Gough (Olympia 419x), 376; 9, Williamson (Olympia 401), 363; 10, Deane-Drummond (Olympia 419), 351; 11, Ellis (Skylark 3), 340; 12, Kaye (Eagle), 325; 13, Fitzroy (Skylark 3b), 324; 14, Kearon (Skylark 3b), 317; 15, A. Goodhart (Fauvette) and Kahn (Eagle), 315; 17, Carrow (Skylark 3b), 309; 18, Warminger (Skylark 3b), 303; 19, Smith (Skylark 3b), 293; 20, Welch (Eagle), 267; 21, James (Skylark 2), 255; 22, Neilson/Wass/Wilson (Skylark 3b), 233; 23, Coulson (Skylark 3b), 220; 24, Rutherford (Skylark 2), 198; 25, Green (Skylark 2), 190; 26, Hampton/Scallon/Holder (Skylark 2), 186; 27, Scott/Collier (Eagle), 182; 28, Thomas/Tweedy (Sky), 148; 29, Morgan/Stowe (Skylark 2), 130; 30, Bayley (Eagle), 122; 31, Minton/Davey (Skylark 2), 111; 32, Hands/Bentson (Sky), 101; 33, Jeffries/Garred (Jaskolka), 92; 34, Dimock (Sky), 80.

League 2: 1, Harwood/Masters/Mettam (Skylark 3b), 464 pts; 2, Sutcliffe/Jones (Skylark 2), 355; 3, Stafford Allen (Olympia 2), 346; 4, Baynes/Blake/Jefferson (Skylark 3b), 342; 5, Phillips/Neumann/Whitfield (Skylark 2) and Coatesworth (Meise), 334; 7, Brett-Knowles/Holding (Skylark 2), 312; 8, Riddell/Fairman (Meise), 295; 9, Paul (Skylark 2), 293; 10, Marshall (Olympia), 290; 11, Croshaw (Gull 4), 283; 12, Aldridge (Eagle), 278; 13, Lee/Erskine/Nixon (Olympia), 257; 14, Dirs/Jeffery (Olympia), 256; 15, Dodd/Westhorpe (Skylark 2), 251; 16, Kerridge/Williams (Olympia), 249; 17, Carr (Olympia), 245; 18, Collins/Warmington (Olympia), 241; 19, Shephard (Skylark 2), 239; 20, Newholm (Olympia 2), 236; 21, Stark (Skylark 2), 230; 22, Corrick/Brown/Chubb (Skylark 2), 225; 23, Inglesby (Olympia), 223; 24, Tarver/Gregg (Olympia), 219; 25, Dorman/Corbett (Eagle), 215; 26, Ware/Longley (Olympia 2), 205; 27, Harwood/Goddard (Swallow), 190; 28, Maygothling/Dunn/Campion (Olympia 2), 180; 29, Burgess (Skylark 2b), 161; 30, Wright/Randle/Swift (Olympia), 159; 31, Shepard/Potts (Skylark 2), 156; 32, Neumark/Thomson (Olympia), 146; 33, Willbie/Snodgrass (Skylark 3b), 138; 34, Doughty/Westman (Kite 2), 123; 35, O'Reilley/Hubble/Parkinson (Olympia), 112; 36, Lastowski (Olympia), 101; 37, Doktor/Hellewell (Swallow), 64; 38, Bishop/Hearsey (Olympia), 62; 39, Pick/Morrison (Swallow), 38; 40, Cunningham/Berthelsen/Glover (T-21b), 32; 41, Riddell (Skylark 1), 29.

Sport and Business

THE ROLLASON TURBULENT recently delivered to Air Cdre. G. J. C. Paul was the 72nd aircraft sold by Rollason Aircraft and Engines Ltd. in the last three years. Most of these have been rebuilt Tiger Moths with overhauled engines and 33 of them have been ferried or shipped abroad. Eight Druine Turbulents have been built and sold by the company. In addition to aircraft sales, some 60 overhauls and conversions on private and club machines have been carried out, and 115 engines (mainly D.H. Queen 2 and 3 and Gipsy Major) have been overhauled or sold, 47 of which have been overseas orders. The Ardem version of the Volkswagen engine has been developed by Rollasons for their Turbulent, and redesign of certain parts is currently being undertaken with the object of increasing the power developed by the engine.

JET STREAMS AND MOUNTAIN WAVES will be the subject of an international scientific congress in Turin on June 4-6 this year. Organised by the Italian Ministry of Defence, the Aero Club of Italy and the Politecnico di Torino, the meeting will discuss jet streams and waves in relation to air navigation, flight safety and soaring flight. Enquiries should be addressed to the Comitato Organizzatore del Congresso, Politecnico di Torino, Corso Duca degli Abruzzi 24, Torino.

AUSTRALIAN SALES of Beechcraft aircraft are to be handled by de Havilland Aircraft Pty Ltd. of Bankstown Airport, Sydney. Spare-part and maintenance service will also be provided by the company, whose territory will cover Australian New Guinea and Papua.

FIRST FLIGHT of the Picchio F.15 prototype, designed by Stelio Frati and built by the Procaer company of Milan, was made on May 7. Powered by a Continental 160 h.p. engine, the Picchio features an all-wood structure skinned with plywood aluminium-plated panels and is designed to accommodate three people. The prototype will be exhibited at the Paris Aero Show next month, and an initial batch of 15 machines is planned.

A GLIDER DEMONSTRATION may be included in this year's flying display on the public days of the S.B.A.C. Exhibition at Farnborough on September 11-13. Other gliding news is that the national glider aerobatic contest will again be held at Dunstable this year, on Sunday, September 20; and that the glider radio frequency in this country has now been changed from 131.9 Mc/s to 130.4 Mc/s.

WIDE INTEREST has been attracted in New Zealand by the spreading of humic compost by aircraft over a wide area of farmland in Hawke's Bay. The aerial use of humic compost is said to represent an almost revolutionary change in New Zealand pasture-improvement techniques. It could lead to greatly expanded demand for compost which, because it is lighter than superphosphate, can be carried in the same quantity as a lighter load.

ANNUAL GENERAL MEETING of the Popular Flying Association will be held at the Kronfeld Club, 74 Eccleston Square, London, S.W.1, at 4.30 p.m. on Saturday, June 6. The meeting will be followed by an informal party to which all interested in light aviation are invited.

UNKNOWN